

# ARMY FIXED-WING GROUND ATTACK AIRCRAFT: A HISTORICAL PRECEDENT AND CONTEMPORARY RATIONALE

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MASTER OF MILITARY ART AND SCIENCE  
Art of War Scholars

by

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## ABSTRACT

ARMY FIXED-WING GROUND ATTACK AIRCRAFT: A HISTORICAL PRECEDENT AND CONTEMPORARY RATIONALE, by CPT John Q. Bolton, 166 pages.

Close Air Support (CAS) depends on close cooperation between ground and air units, predicated on mutual understanding and close proximity. CAS also depends on aviator training and aircraft characteristics. Despite predictions of air power's dominance, air-ground teams are the most effective employment of military power. This thesis demonstrates that the modern Army Combat Aviation Brigade mimics the WWII Tactical Air Command's effective, close working relationship between air and ground units.

However, Army Aviation lacks fixed-wing attack aircraft, forcing the Army to rely on the Air Force for fixed-wing CAS. Utilizing non-organic means for critical functions violates unity of command and results in CAS performed by aircraft primarily designed for other missions. This situation is likely to worsen in the coming years. This thesis summarizes Army-Air Force CAS issues since WWII and argues that the Army requires an organic fixed wing attack aircraft to bridge the capability gap between its helicopters and USAF platforms at the tactical level. Fielding such aircraft would free the Air Force to focus on its broader missions while enhancing the capabilities of Army Aviation.

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## ACRONYMS

AAF	Army Air Forces (WWII)
ACTS	Air Corps Tactical School
AGF	Army Ground Forces (WWII)
ASOG	Air Support Operations Group
ATO	Air Tasking Order
C2	Command and Control
CAB	Combat Aviation Brigade (Army)
CAS	Close Air Support
CCA	Close Combat Attack
CENTCOM	US Central Command
DoD	Department of Defense
FAC(A)	Forward Air Controller (Airborne)
FM	Field Manual (Army)
FW	Fixed-Wing (Aircraft)
IADS	Integrated Air Defense System
JCAS	Joint Close Air Support
JFACC	Joint Forces Air Component Command
JTASB	Joint Tactical Air Support Board
RW	Rotary-Wing (Aircraft)
USA	United States Army
USAF	United States Air Force
WWII	World War II



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## CHAPTER 1

### INTRODUCTION

It is the predilection of ground commanders to achieve maximum independence and initiative through the command and control of all resources, including air, involved in ground operations. Similarly, it is in accord with the natural preference of airmen to engage in air battle and to perform tasks that are independent and self-initiated, not tied directly to the needs and wishes of the ground forces.

— Alfred Goldberg and Donald Smith, “The Close Air Support Issue”

On June 9 2014, a United States Air Force (USAF) B-1B bomber dropped two 500lb GPS-guided bombs on a team of Army Special Forces and Afghan security forces, killing five.<sup>1</sup> Numerous errors on by the aircrew and ground element contributed to deaths on the ground, all of which are historically endemic to Close Air Support (CAS). The terminal controller was unfamiliar with the operating environment and the aircrew could not visually acquire either the friendly or the enemy positions from 12,000 feet above ground level. Because they believed the aircraft’s targeting pod could identify friendly strobe lights, the air-ground team “collectively failed to effectively execute the fundamentals, which resulted in poor situation awareness and improper target identification.”<sup>2</sup> Sadly, when it comes to CAS, this type of tragic incident is too common.

No military cooperation issue creates more acrimony than CAS. CAS has been contentious since the first aircraft teamed with ground forces and remains so today. These friction points are relative priority of CAS and Interdiction; operational control of CAS aircraft and; aircraft characteristics. The history of Army-Air Force CAS largely consists of poor initial efforts followed by the development of workable systems success as effective air-ground teams and aircraft developed on the battlefield. No organizational

processes or technology has been able to bridge the Army-Air Force CAS divide. This thesis examines that divide, proposing an Army Fixed-Wing (FW) aircraft as a solution.

**Close Air Support (CAS):** Air action by fixed- and rotary-wing aircraft against hostile targets that are in **close proximity to friendly forces and that require detailed integration** of each air mission with the fire and movement of those forces.

**Air Interdiction:** Air operations conducted to divert, disrupt, delay, or destroy the enemy's military surface capabilities before it can be brought to bear effectively against friendly forces, or to otherwise achieve objectives that are conducted at such distances from friendly forces that **detailed integration of each air mission with the fire and movement of friendly forces is not required.**

Figure 1. Definition of CAS and Air Interdiction

*Source:* Joint Chiefs of Staff, Joint Publication 1-02 *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: GPO, 2015), 8, 34.

The United States Army's relationship with the Air Force has been complicated since before World War II. Since its independence in 1947, USAF support to the Army has come in a variety of forms, primarily: Strategic and intra-theater airlift, Interdiction, aerial reconnaissance, and CAS. Army-Air Force integration has a long and sometimes conflicted history. Though the balance of support and relative priorities between the services continuously ebbed and flowed since the 1940s, Air Force control of all fixed-wing (FW) attack aircraft remained constant.

The first major point of disagreement concerns the relative priority between Interdiction and CAS. While both services agree that subsequent ground or air operations first require Air Superiority, the Air Force—based on a unitary view of air power exhibited by service culture, history, and doctrine—prioritizes Interdiction. During the

1930s, Air Corps leaders such as MG Haywood Hansell at the Air Corps Tactical School (ACTS) developed a scientific approach to air power that has not evolved significantly since World War II (WWII).<sup>3</sup> The ACTS took the offensive characteristics of air power pioneered by theorists such as Army BG William Mitchell and Italian Giulio Douhet to the next level, espousing a mechanistic approach to air planning.<sup>4</sup> This approach depends on technology and the “uniqueness” of air power, requiring application through an autonomous air force comprised of airmen—Mitchell’s aerial knights—who understand air power’s inherent advantages.<sup>5</sup> A consequence of this mechanistic approach is doctrinal thinking which largely ignores friction in war, instead considering conflict largely a vast engineering problem, solvable with enough effort and technology.<sup>6</sup> According to USAF doctrine, Interdiction inhibits disrupts or degrades the “enemy’s military potential before it can be brought to bear effectively against friendly forces.”<sup>7</sup> CAS is relatively messy by comparison and certainly lacks the supposed precision of Interdiction. Moreover, CAS is in service to the ground force’s mission, as opposed the air force’s goal. Consequently, the Air Force has undervalued the importance of CAS since the days of the ACTS. The Army, on the other hand, sees CAS as more effective because it directly supports ground operations.

Second, the Army’s need to respond to changing tactical situations means ground commanders want control over CAS. Historically, the Army has desired operational control of aircraft, while the USAF sought to act as commander for all air assets. This is both an institutional and functional division; ground commanders inevitably want support at their tactical command, while the air commanders have a broader view. Differing

priorities, based on fundamentally different viewpoints, created significant differences between Army and Air Force viewpoints and prevented common understanding.

Lastly, the Army and Air Force have consistently disagreed on the characteristics required for an effective CAS aircraft. The Army wants a forward-deployable, austere runway capable, aircraft that has the following characteristics: long loiter time, effective weapons load, and air-ground communications equipment. The Air Force acknowledges the preferred traits of a CAS aircraft, but generally seeks multi-purpose jets that can operate across the broad spectrum of USAF operations, from Interdiction and air-to-air combat, to CAS. Because of this broader view of operations and a service culture that views CAS as “the most inefficient method of employing air power,” the Air Force seeks multi-role aircraft they believe provide, “greater flexibility, and capability.”<sup>8</sup>

Since the Air Force believes Air Superiority and Interdiction are more effective uses of air power than CAS, its aircraft are designed accordingly. In defiance of history and common sense, the Air Force wants aircraft that are “properly conceived” for Air Superiority and Interdiction, believing the result will have “the minimum acceptable attributes” for CAS.”<sup>9</sup>

In Korea and Vietnam, USAF jets performed CAS poorly; eventually the USAF largely replaced jets with legacy propeller aircraft. In Desert Storm and the War on Terror, Army helicopters performed a significant CAS role, alleviating the need for Air Force adaptation. The development of Army Aviation somewhat hid Army-Air Force disagreements over CAS, as Army helicopters supplied much of the Army’s CAS under a different name. Multi-role jet aircraft such as the F-4 and F-111 were ill suited to CAS, while aircraft such as the F-18 and F-15 are over-equipped for CAS. Given the low

priority the Air Force places on CAS, it designs aircraft for air-to-air combat and Interdiction, fielding no CAS-specific aircraft in large numbers. Whereas CAS is the lowest USAF tactical priority, it is a primary concern for the Army.

The role of the Army is to “Conduct prompt and sustained combined arms combat operations on land . . . in order to defeat enemy ground forces, and seize, occupy, and defend land areas.”<sup>10</sup> Critical to this role is the employment of combined arms teams, “Two or more arms mutually supporting one another, usually consisting of a mixture of infantry, armor, aviation, field artillery, air defense artillery, and engineers.”<sup>11</sup> Since Vietnam, Army Aviation, consisting nearly entirely of helicopters, has been critical to Army operations. While CAS is not an Army function, the Army employs attack in “over the shoulder” fire support and Interdiction roles.<sup>12</sup> Though Army helicopters may utilize CAS procedures, they primarily use less formal methods not requiring terminal control, instead relying on close integration with Army units.<sup>13</sup> Regardless, Army doctrine acknowledges the importance of FW CAS.

ADRP 3-0 *Unified Land Operations* and ADRP 3-90 *Tactics* describe CAS as a requirement for successful Army operations.<sup>14</sup> Most importantly, FM 3-90.6, which describes employment of Army Brigade Combat Teams (BCTs), the Army’s primary warfighting unit, states CAS is a requirement for BCT operations: “BCTs accomplish their missions by integrating the actions of maneuver battalions, field artillery, aviation, engineer, air and missile defense, close air support, and naval gunfire.”<sup>15</sup> While integrating helicopters into operations, the Army needs CAS to perform its primary role.

While the Army views CAS as a vital component of combined arms, the Air Force views it as a high risk, low payoff mission. This risk “often makes a dubious trade-

off for the damage inflicted, all of which makes Interdiction more effective from the Air Force's perspective."<sup>16</sup> Air Force CAS ambivalence turns on "concerns the efficacy of using precious aircraft sorties on dispersed targets close to, or intermingled with, friendly troops where the risk of fratricide is great."<sup>17</sup> Given the Air Force's historic aversion to CAS and the significant capabilities of Army Aviation, one might wonder: does the Army even need CAS? Could the Army provide the same capabilities with helicopters and artillery? Some Air Force officers argue that an effective combined arms team should not need CAS at all, or that CAS is a type of emergency support.<sup>18</sup>

Since CAS is vital to combined arms maneuver, the Army should develop organic CAS assets to augment USAF CAS. Army Aviation already does this using attack helicopters. However, FW aircraft offer advantages over helicopters in terms of speed, loiter time, and cost, all of which could complement both Army helicopters and USAF CAS. Current doctrine and organizational thinking preclude Army Aviation from utilizing FW attack aircraft. This thesis re-evaluates that situation by approaching the problem from another direction.

### Problem Statement

If CAS is an essential element of combined arms maneuver, then the Army should develop fixed-wing attack aircraft to supplement its helicopters in order to perform the full spectrum of CAS. Is there a historical precedent demonstrating effective CAS employment and air-ground teamwork on a large-scale? In light of a precedent, what form should an Army CAS platform take?



### Primary Research Question

Could an Army FW attack aircraft fill the gap between Army helicopters and Air Force CAS?

### Secondary Research Questions

1. Is there a gap between Army helicopters and USAF aircraft in terms of capabilities and cost? Does this gap mean the Army should supplement USAF CAS?
2. How do Combat Aviation Brigades compare to World War II Tactical Air Commands? Are there artificial limits on the capabilities of the CAB?
3. What are the desired characteristics of CAS aircraft from a ground perspective?

### Significance of this Study

The purpose of this study is to determine if there is a historical and contemporary rationale for including an Army FW ground attack aircraft. This paper's conclusions could lead to the Army acquiring a FW aircraft to augment its helicopters, enhancing the Combat Aviation Brigade's (CAB) capabilities and improve integration with joint and multi-national partners.

The pending retirement of the A-10, the USAF's only dedicated CAS platform, has brought elevated attention to Joint CAS (JCAS). The USAF provides CAS primarily using the F-16C and F-15E, both scheduled for replacement by the F-35A, an advanced multi-role platform.<sup>19</sup> While multi-role utility, high technology, speed, and stealth, partly justify a single USAF airframe, there are other issues.<sup>20</sup> Relying on a single platform for missions varying from air-to-air combat to Interdiction to CAS is controversial, even

within the Air Force.<sup>21</sup> Coupled with declining or flat military budgets for the near future, the Army, as the only service without FW CAS, should be anxious.

However, the debate surrounding the F-35 misses the larger and less ephemeral aspects of CAS such as the respective roles and missions of the Army and Air Force. This paper assesses the historical precedent and the current rationale for fielding such an aircraft. This is not as controversial as it seems; Army Aviation already augments USAF intra-theater airlift and aerial reconnaissance. Furthermore, Army helicopters (AH-64D/E) perform the same basic tasks as USAF CAS aircraft.<sup>22</sup> The fundamental difference between Army helicopters and CAS lies in doctrine. Army doctrine considers its helicopters as a maneuver element and calls Army Aviation weapons employment near ground troops Close Combat Attack (CCA) as opposed to CAS (Appendix D).<sup>23</sup>

This debate surrounding CAS is not new, though the specific arguments and points of contention have evolved over time. Vested and parochial service interests as well as aircraft cost have routinely caused Congressional inquiries, inter-service boards, and numerous outside studies.<sup>24</sup> In *Case Studies in the Development of Close Air Support*, I.B. Holley summarized issues surrounding CAS from WWII through the 1980s:

Even if there were no other factors present to complicate [CAS], the conflicting attitudes engendered by this subject in those involved would almost certainly be sufficient to account for many of the difficulties encountered. However, the sharply differing attitudes of air and ground troops on the subject of close air support are reflected in many other dimensions of the problem, notably the organizations designed to carry out the mission. Army officers have repeatedly sought to have [CAS] directly under the control of the ground force commander in the same way that artillery responds to his authority. This yearning reflects a reversion to the time before the Air Force gained its autonomy.<sup>25</sup>

An Army FW aircraft will not resolve the debate. However, looking at the issue from a perspective of an Army CAS platform shifts the paradigm from an add-on mission

for USAF aircraft otherwise focused on air-to-air combat and Interdiction to one of an organic aircraft focused primarily on CAS in environments where the Air Force already provides Air Superiority. In these environments, it makes little sense to employ high-tech jets otherwise designed for attacking targets deep in enemy territory or dueling with enemy fighters. The US Military is in a state of strategic change in terms of missions, priorities, and budgets. Exhausted by long wars but still filling seemingly unending global commitments, the services are struggling to develop particular ways and means to address the challenges of transformation, exacerbated by budget cuts.

The Air Force has proven its effectiveness in missions including Strategic Attack, Counterair, Interdiction, and Air-Mobility, but it does not view CAS as a priority mission, for both historical and institutional reasons.<sup>26</sup> While USAF doctrine regards CAS as a complement to Interdiction as part of Counterland Operations, CAS will always come second to Strategic Attack and Interdiction because “Airmen feel the best uses of air and space power in order are: air superiority, strategic attack, air interdiction, and CAS.”<sup>27</sup> This prioritization, echoed in doctrine, is also predicated on airmen exercising centralized control of air power:

airpower can seize the initiative, set the terms of battle, establish a dominant tempo of operations, better anticipate the enemy through superior observation, and take advantage of tactical, operational, and strategic opportunities. Thus, airpower can simultaneously strike directly at the adversary’s centers of gravity. . . This capability allows airpower to achieve effects well beyond the tactical effects of individual actions.<sup>28</sup>

Though centralized control is efficient to airmen, ground forces view it as less effective.

Since its early history, the Air Force’s adherence to air power tenets coupled with a concomitant focus on overpowering the enemy through the air—to defeat without disarming—set it at odds with the Army and Navy.<sup>29</sup> Because of its desire to win

conflicts independently, the Air Force broadly sees support to other services as a distraction. USAF doctrine proclaims, “This approach normally leads to more inclusive and comprehensive perspectives that favor strategic solutions over tactical ones.”<sup>30</sup> Consequently, USAF aircraft development and doctrine generally ignored niches such as light intra-theatre airlift and CAS-specific aircraft.<sup>31</sup>

This focus on broad operations manifests in Air Force procedures. USAF aircraft receive orders via the Air Tasking Order (ATO), issued every day. Though the ATO process is well suited to synchronizing distributed Air Force efforts for missions like Interdiction and Air Mobility, it negatively affects CAS because it prevents repetitive close coordination between air and ground units. The ATO framework is based on mechanistic thinking such as targeting, weaponeering, and allocation that work well for attacking enemy command and control (C2) systems and fixed sites, but actively inhibits processes that make CAS effective like mutual understanding and close cooperation.<sup>32</sup> Furthermore, although multi-role aircraft like the F-16 and F-15E can perform multiple missions, that does not mean they perform CAS well.

This is an advantage to the Air Force, but a detriment to ground forces. Pilots support different ground units, often widely spread out with vastly different missions. As a result, even enthusiastic CAS pilots less readily understand the ground plan and have difficulty developing close working relationships with ground units, both critical factors to effective CAS. Despite these problems, the Air Force prefers this arrangement.

A look at joint doctrine demonstrates the substantial differences between how the Air Force provides CAS to the Army, while the Marines provide CAS organically (Appendix G). While Army air support requests go through multiple Army and Air Force

echelons, from the Army BCT to the ACC, the Marines employ organic CAS directly as part of an air-ground team.<sup>33</sup> Coordination occurs at a much lower level, enabling air-ground cooperation. Like Marine Aviation, CABs are organic to Army divisions, but lack FW attack aircraft. Though it does occur, joint doctrine does not necessarily produce Army-Air Force tactical cooperation, which nests well with the USAF view of CAS.<sup>34</sup>

In *50 More Questions Every Airman Can Answer*, the USAF describes its view of CAS: “Airmen think in terms of missions, not platforms. As such, Airmen usually prefer multi-roled aircraft. . . While not focused solely on CAS, the multi-roled aircraft provides greater flexibility and capability to the [theater commander].”<sup>35</sup> The document continues, “In reality, the Airman ranks CAS based on efficiency, not importance.”<sup>36</sup> Though anathema to the Army, this accurately describes the Air Force’s vision of warfare, global and technology-centric. The USAF thirty-year strategy mentions of strategic strike, standoff, and even nanotechnology along with a “full spectrum” view of global measures, focused on “high-end” warfare, without mentioning CAS.<sup>37</sup>

CAS does not necessarily have to be a point of contention between the Army and Air Force. To air power purists, CAS is a high-demand, low return mission. Aircraft fly long hours, often without engaging targets. Though CAS targets are vitally important to ground forces, they are less so to the air commander focused on operational-level effects. Expecting the Air Force to accomplish this exceedingly low-tech mission with highly developed, expensive aircraft designed for Air-to-Air Combat and penetration of sophisticated Integrated Air Defense Systems (IADS) is problematic and expensive.

An Army FW aircraft would reduce USAF requirements. To be sure, we cannot simply expect a permissive environment for future CAS. However, an Army FW ground

attack aircraft, designed for CAS and tailored to operate in a semi-permissive environment envisioned by TC 7-100 *Hybrid Threat*, would meet the majority of future operating environments.<sup>38</sup> Even if an Army FW attack aircraft were unable to initially operate in future settings due to a threat, having that eventual capability would relieve the USAF over the long-term. In other words, if an Army aircraft could operate in 80 percent of environments, it would allow the USAF to focus on high-end threats.

This thesis argues that Air Force multi-role aircraft are lacking in areas critical to providing effective support to ground forces. In fact, an Army attack aircraft would reduce, but not eliminate, the requirement for USAF CAS, freeing the USAF to focus on its institutionally preferred mission of Interdiction.<sup>39</sup> The USAF is tied to air power theory as espoused by Douhet and Mitchell, both institutionally and culturally. Consequentially, the USAF broadly regards CAS as a misapplication of air power. Effective CAS depends on close coordination between the ground and air elements. Practically this is difficult for a variety of reasons, not the least of which is the fact that separate services have different communications, basing, and training paradigms.

To ascertain the practicality of an Army FW attack aircraft this thesis examines the history of Army-Air Force CAS. It then compares the current Army CAB to WWII Tactical Air Commands (TACs), showing the similarities. Building on this similarity and cost, this thesis contends that an Army FW ground attack aircraft would enhance the Army's capabilities and fill the gap between Air Force CAS and Army Aviation.

#### Organization of this Study

After discussing the history of Army-Air Force CAS, this study examines a historical example of CAS support from WWII. The similarities between WWII tactical

air forces and the modern Army CAB are contrasted before examining the desired characteristics of CAS aircraft and factors such as capabilities and cost.

This thesis contains six chapters. Chapter 1 introduces the problem. Chapter 2 provides a historical overview of CAS, beginning with an effective air-ground team before moving forward to the present. The chapter illustrates the various issues such as aircraft design, priority, and control of CAS since WWII. Chapter 3 is a literature review. Chapter 4 outlines the research methodology used. Chapter 5 provides analysis and, compares a WWII example to the current Army CAB, providing a historical precedent for an Army FW ground attack aircraft. Chapter 5 concludes by providing a contemporary rationale for this type of Army aircraft in terms of cost and capability. Chapter 6 summarizes the findings and provides recommendations.

### Assumptions

This thesis makes three key assumptions. First, the Department of Defense (DoD) and USAF will not object to an Army FW attack aircraft. Historically, the Air Force views Army FW attack aircraft as an encroachment on its role. However, this thesis proposes that the Army FW aircraft would augment, not replace USAF CAS, taking low-end missions, allowing the USAF to focus operations against near-peer threats and sophisticated IADS as opposed to long, costly flight hours flown supporting Army units. Second, the author assumes existing FW aircraft meet Army requirements with little modification. At first glance, this is a poor assumption. However, industry has provided turboprop aircraft for the CAS to other militaries including Brazil and Columbia. Furthermore, the modern turboprop aircraft are the descendants of similar Army and Air

Force aircraft employed in Korea and Vietnam. Third, close cooperation requires close proximity, aided, not replaced by technology.

### Limitations of this Study

The author focused specifically on the issue of an Army-Air Force CAS and the gap between USAF CAS and Army helicopters. This thesis explores only current FW aircraft and present capabilities. This thesis focuses on Army-Air Force CAS, reviewing Marine CAS when pertinent.

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<sup>1</sup> Jeffrey Harrigan, MG, USAF, “Executive Summary of Coalition Airstrike in the Vicinity of Arghandab, Afghanistan on 9 June 2014,” US Central Command, August 2014, accessed May 8, 2005, <http://www.scribd.com/doc/238691680>.

<sup>2</sup> Ibid., 2.

<sup>3</sup> Barry D. Watts, LTC, USAF, “The Foundations of US Air Doctrine-The Problem of Friction in War” (Research paper, Air University, 1984), xv-6.

<sup>4</sup> Ibid., xvi, 10, 18.

<sup>5</sup> William Mitchell, BG, USA, “Winged Defense” (1925), in *Roots of Strategy-Book 4*, ed. David Jablonsky (Mechanicsburg, PA: Stackpole), 434-518; Watts, 10.

<sup>6</sup> Watts, 10.

<sup>7</sup> Department of the Air Force, Volume 4-*Operations* (Washington, DC: GPO, 2013), accessed April 1, 2015, <https://doctrine.af.mil>.

<sup>8</sup> Department of the Air Force, *50 More Questions Every Airman Can Answer*, by MAJ Frederick Baier, USAF (Washington, DC: GPO, April 2002), 17, accessed May 15, 2015, <http://www.au.af.mil/au/awc/awcgate/afdc/50morequestions.pdf>.

<sup>9</sup> Tactical Air Command, “Final Report,” Tactical Air Operations Review Board,” June 21, 1949, Quesada Papers, Box 7: USAF Board of Review for Tactical Operations, 1949, Manuscript Division, Library of Congress, Washington, DC.

<sup>10</sup> Department of Defense, Directive 5100.01 *Functions of the Department of Defense and Its Major Components* (Washington, DC: GPO, 2010), 30, accessed March 1, 2015, <http://www.dtic.mil/whs/directives/corres/pdf/510001p.pdf>.



<sup>11</sup> Headquarters, Department of the Army, Army Doctrine Reference Publication (ADRP) 1-02 *Terms and Military Symbols* (Washington, DC: GPO, 2015), 1-17.

<sup>12</sup> Headquarters, Department of the Army, Field Manual (FM) 3-04.126 *Attack Reconnaissance Helicopter Operations* (Washington, DC: GPO, 2007), 1-4.

<sup>13</sup> Ibid., 1-4, 3-59.

<sup>14</sup> Headquarters, Department of the Army, Army Doctrine Reference Publication (ADRP) 3-0 *Unified Land Operations* (Washington, DC: GPO, May 2012), 1-15; Headquarters, Department of the Army, Field Manual (FM) 3-90.6 *Brigade Combat Team* (Washington, DC: GPO, 2010), 1-10.

<sup>15</sup> Headquarters, Department of the Army, FM 3-90.6, 1-10.

<sup>16</sup> I. B. Holley, “A Retrospect on Close Air Support,” in *Case Studies in the Development of Close Air Support*, ed. Benjamin Frankling Cooling (Washington, DC: Office of Air Force History, 1990), 555.

<sup>17</sup> Edward V. Weber, MAJ, USAF, “The Future of Fixed-Wing Close Air Support: Does the Army Need It to Fight?” (Master’s thesis, Army Command and General Staff College, 1998), 8.

<sup>18</sup> Ibid., ii. Webber argues that the Army, if a true combined arms team, does not need USAF CAS.

<sup>19</sup> For a discussion on the Air Force’s view of air power see Department of the Air Force, Volume 1-*Basic Doctrine* (Washington, DC: GPO, October 2011), accessed April 1, 2015, <https://doctrine.af.mil>.

<sup>20</sup> Holley, 537.

<sup>21</sup> Objections to the F-35 are primarily based on cost, not necessarily capabilities. However, the concept for a non-jet CAS aircraft is not new. See David Arthur and Kevin Eveker, *Alternatives for Modernizing U.S. Fighter Forces* (Washington, DC: Congressional Budget Office, 2009), accessed March 15, 2015, <http://www.cbo.gov>; Michael W. Pietrucha, COL, USAF, “The Comanche and the Albatross,” *Air and Space Power Journal* 28, no. 3 (May-June 2014); Russell J. Smith, COL (Ret) USAF, “Common Sense at the Crossroads for Our Air Force,” *Air and Space Power Journal* 26, no. 2 (March-April 2012); Steven J. Tittel, MAJ, USAF, “Cost, Capability, and the Hunt for a Lightweight Ground Attack Aircraft” (Master’s thesis, Army Command and General Staff College, 2009).

<sup>22</sup> The Air Force has approximately 2,300 aircraft, while the Army has 3,500.

<sup>23</sup> Headquarters, Department of the Army, FM 3-04.126, 3-59.

<sup>24</sup> Michael N. Riley, MAJ, USA, “The A-10 Thunderbolt as an Organic Army Asset” (Master’s thesis, Army Command and General Staff College, 1991), 131-33.

<sup>25</sup> Holley, 541.

<sup>26</sup> Department of the Air Force, Volume 4-*Operations*, 19-35.

<sup>27</sup> Baier, 16-17.

<sup>28</sup> Department of the Air Force, Volume 1-*Basic Doctrine*, 28.

<sup>29</sup> Robert M. Farley, *Grounded: The Case for Abolishing the United States Air Force* (Lexington, KY: University Press of Kentucky, 2014), 32.

<sup>30</sup> Department of the Air Force, Volume 1-*Basic Doctrine*.

<sup>31</sup> Donald A. MacCuish, “The Flight to Irrelevance?,” in *Routledge Global Security Studies*, ed. Aaron Karp, Regina Cowen Karp, and Terry Terriff (New York: Routledge, 2008), 218-21.

<sup>32</sup> Joint Chiefs of Staff, Air Land Sea Application Center (ALSA), ATP 3-52.2 *Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System* (Joint Base Langley Eustis, VA: GPO, June 2014), 56.

<sup>33</sup> *Ibid.*, Chapter II and Chapter V.

<sup>34</sup> *Ibid.*, Chapter II.

<sup>35</sup> Baier, 16-18.

<sup>36</sup> *Ibid.*, 16-17.

<sup>37</sup> Headquarters, Department of the Air Force, *America’s Air Force: A Call to the Future* (Washington, DC: GPO, 2014), 6, 16, 18, accessed May 7, 2015, [http://airman.dodlive.mil/files/2014/07/AF\\_30\\_Year\\_Strategy\\_2.pdf](http://airman.dodlive.mil/files/2014/07/AF_30_Year_Strategy_2.pdf).

<sup>38</sup> Headquarters, Department of the Army, Training Circular (TC) 7-100 *Hybrid Threats* (Washington, DC: GPO, November 2010), 6-1.

<sup>39</sup> Since before WWII, the Air Force has preferred Interdiction and Strategic Bombing. CAS is a complicated mission requiring substantial integration for tactical effects. The JFACC structure itself trends toward Interdiction given its broader view of the battlefield and the Air Force institutional preference for that mission.

## CHAPTER 2

### HISTORICAL BACKGROUND

I beg of you, to know yourself and your weapons, and to be frank among yourselves and with the rest of the Army. The Army will believe what the Air Corps says it can do, and rely on it. If its prowess is exaggerated, through whatever cause, disillusionment surely will come with war.

— LTG Lesley McNair, Address to Graduating Airmen, 1938

Quick and accurate cooperation of this sort did not come in a day; it grew with the airmen's and soldiers' mutual confidence, understanding, and pride in one another's achievements.

— Field Marshall Viscount Slim, *Defeat into Victory*

#### Northern France

By 1944, the Allied air doctrine was relatively clear, though only after conflict between the Army Ground Forces (AGF) and the Army Air Forces (AAF) in North Africa. The AAF's primary doctrine, FM 100-20 *Command and Employment of Air Power* was not welcomed by the AGF. LTG Leslie McNair, the AGF commander, was unaware of FM 100-20 until its publication in July 1943.<sup>1</sup> The new manual proclaimed the AAF's independence, using capital letters on the first page "LAND POWER AND AIR POWER ARE CO-EQUAL AND INTERDEPENDENT FORCES; NEITHER IS AN AUXILIARY OF THE OTHER."<sup>2</sup> While McNair and the AGF were not pleased with how FM 100-20 came into existence, the manual clarified the roles and priorities for the application of air power, which had caused issues in North Africa. FM 100-20 outlined two types of air forces: "the normal composition of an air force includes a strategic air force, a tactical air force, an air defense command, and an air service command."<sup>3</sup> FM 100-20 also clearly laid on the priorities for air operations: (1) Air

Superiority; (2) Interdiction; (3) CAS.<sup>4</sup> FM 100-20 represented clear doctrine after much infighting between ground and air commanders in North Africa and Sicily.

In Northern Europe, the 9th Air Force, commanded by LTG Hoyt Vandenberg, consisted of tactical aircraft, including fighters, fighter-bombers, and reconnaissance aircraft. The 9th's operational units were the TACs, each aligned with a field army. The TACs commanded one to three fighter wings consisting of seven to twelve fighter-bomber groups (100 aircraft each) and a reconnaissance group.<sup>5</sup> The heavy bombers were part of the American 8th Air Force and British Bomber Command, the Combined Bomber Offensive. Together the American and British bombers attacked Germany with the Americans attempting daylight precision bombing while the British attack at night.

The focus on strategic operations meant that the bombers did not—and had no means to—directly support ground forces. This became a major issue in the spring of 1944. The Supreme Allied Commander, GEN Dwight Eisenhower, wanted bombers to strike rail and highway targets in France prior to the Normandy Landings. “Bomber barons” like Sir Arthur Harris obstinately fought Eisenhower until he threatened to resign.<sup>6</sup> Eisenhower received control of the bombers, but the dispute exposed the major rift between the AAF and AGF.<sup>7</sup> From May to June the bombers “swung their efforts almost exclusively to tactical attacks in preparation for Overlord, hitting airfields, rail targets, road bridges and coastal targets” in addition to airfields within “130 miles of the assault beach,” to neutralize the Luftwaffe.<sup>8</sup> Eisenhower later said insisting on the bombers “represented his own greatest contribution to the success of the landings.”<sup>9</sup> While attacks against beach defenses had limited effects, the bombing destroyed the French rail network, limiting the non-motorized Wehrmacht to roads.<sup>10</sup>

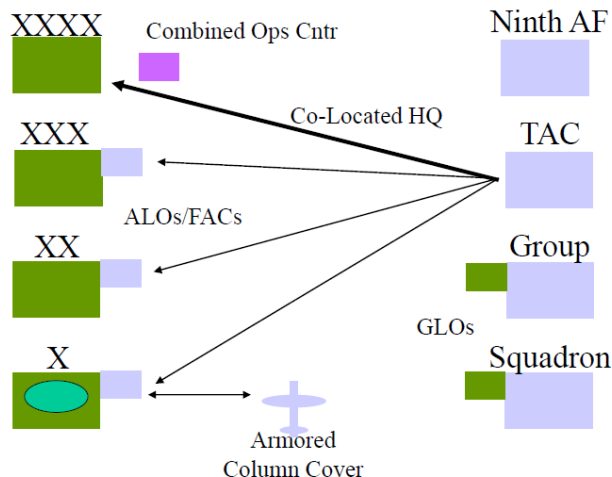


Figure 2. TAC Operations - Fall 1944

*Source:* Dr. Christopher Gabel, “Normandy Campaign-Art of War Scholars AY 14-02” (lecture, Army Command and General Staff College, February 2015).

Unlike the strategic bombers, the 9th Air Force’s mission centered on the Allied field armies and Vandenberg resisted all attempts to distract him from that task.

Vandenberg aligned each of his TACs with a field army and stressed the importance of air-ground cooperation through a formal program of exchange officers between air and ground units. In fact, Vandenberg's initial chief of staff was an infantry officer.”<sup>11</sup>

Though formally separate according to FM 100-20, Army and TAC commanders, having fought together since 1942, generally allowed battlefield realities and personal relationships to trump doctrinal rigidities.<sup>12</sup>

The best example of air-ground effectiveness was the 3rd Army-XIX TAC team. Based on mutual understanding and proximity, GEN George Patton, commander of 3<sup>rd</sup> Army and BG Otto Weyland, commander of XIX TAC, espoused close cooperation and forged an effective air-ground team. AAF GEN Carl Spaatz, commander of US Strategic

Air Forces, described the Patton-Weyland team as, “What you've seen is the greatest example of air-ground cooperation that has ever been or will ever be.”<sup>13</sup>



Figure 3. GEN Patton and BG Weyland

*Source:* David Spires, *Air Power for Patton's Army: The XIX Tactical Air Command in the Second World War* (Washington, DC: USAF History Program, 2002).

Though some AAF officers used FM 100-20 to demand coequal status with ground forces, Weyland “viewed [FM 100-20] as a starting point to evolve doctrine to fit the situation.”<sup>14</sup> Weyland and Patton formed a cohesive team—an anecdote has them splitting a bottle of bourbon during their first meeting—with Weyland’s soft-spoken personality complementing Patton’s boisterousness.<sup>15</sup> Patton with his emphasis on maneuver was well suited for the nuances of air power employment, subject as it was to the variables of weather, maintenance, and communication. While many AAF officers would have been apprehensive about working with Patton, Weyland embraced his role as “a tactical airpower expert.”<sup>16</sup>

Patton, a pilot himself, appreciated the viewpoint and capabilities of aircraft.<sup>17</sup> Supplementing Patton’s interest in aircraft was Weyland’s career-long drive to

appreciate the needs and perspective of ground commanders. Despite the AAC/AAF focus on strategic bombing, Weyland spent most of his career in tactical operations. Consequently, he knew “ground forces forwards and backwards” and developed an “appreciation of what they have to do and what their problems were.”<sup>18</sup> While in England, Weyland foresaw the need for his pilots to function as aircraft controllers, both in flight and on the ground. He established a control center in Southern England so his units “would get a good deal of practice in plotting and monitoring operational flights, setting up routines and methods” necessary to provide comprehensive support to 3rd Army.<sup>19</sup> After the breakout from Normandy, Weyland expressed his intent to the fighter-bombers, declaring the “first priority was cover of the armored units.”<sup>20</sup> This came as a welcome relief to Patton, given his frustration with the AAF in North Africa.<sup>21</sup> Once on the continent, Patton envisioned a rapid advance and would need air cover to protect his army. He issued a challenge to XIX TAC, saying, “I will go so fast that the Air Forces are going to have a helluva time keeping up with me.”<sup>22</sup>

Patton’s challenge proved prescient for Weyland and the XIX TAC. To support Patton, “Weyland threw away the air power book, decentralizing operations, delegating command, dispersing assets as the situation dictated.”<sup>23</sup> As 3rd Army advanced, Weyland moved his headquarters frequently to keep up. At one point in late August 1944, XIX TAC had four separate C2 elements spread across northern France in order to coordinate its subordinate units operating from a dozen different airfields.<sup>24</sup> That August, XIX TAC headquarters moved seven times, displacing nearly 250 miles.<sup>25</sup> The frequent movements demonstrated that Weyland understood his headquarters needed

proximity to the ground commander in order to produce close cooperation and mutual understanding between ground and air units.

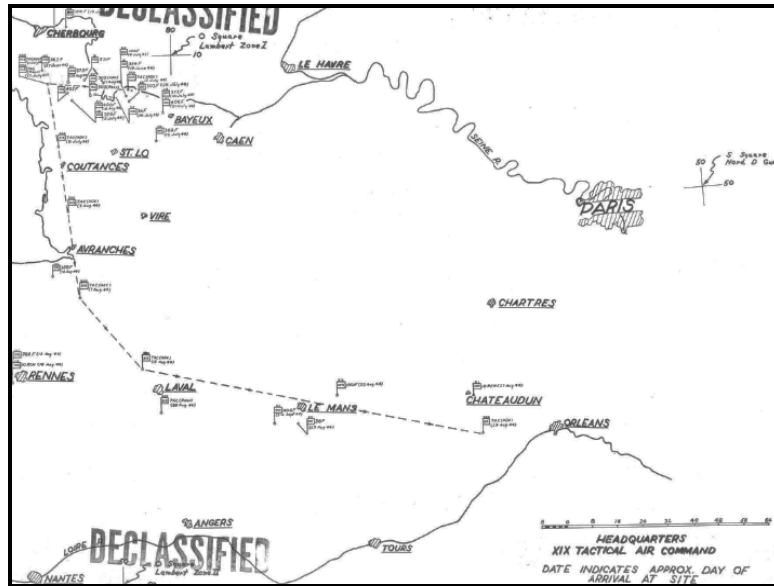


Figure 4. XIX TAC Headquarters Movements, August 1944

*Source:* XIX TAC, “Twelve Thousand Fighter-Bomber Sorties: XIX Tactical Air Command's First Month of Operations in Support of Third US Army” (France, September 1944), accessed March 1, 2015, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll8/id/356>.

Communications difficulties were another story; well into 1944, tactical units lacked compatible radios.<sup>26</sup> Infantry and tank crews in the same unit could not communicate until soldiers welded and wired handsets onto tanks. A common sight was an M4 Sherman tank with multiple antennas sticking out of a hatch, all linked to a hodgepodge of radios.<sup>27</sup> To augment the ability of XIX TAC aircraft to communicate with the armored columns, Weyland adopted the approach of MG Pete Quesada, commander of IX TAC, XIX TAC's counterpart. During the Normandy stalemate in



July, Quesada made his way to the front and hastily installed a radio in a Sherman tank, allowing the crew to communicate with aircraft overhead. Despite more than two years of combat, aircraft and ground units still could not reliably communicate. Following Quesada's example, known as Armored Column Cover, Weyland detached pilots to accompany each column commander to "advise him concerning the capabilities of air and how to bring aircraft on to their targets."<sup>28</sup> Additionally and there were no air-ground radio sets or air liaison officers below divisions.<sup>29</sup> Weyland recognized the deficit of liaison officers and increased them by a factor of three.<sup>30</sup>

By late July, Weyland had developed a working relationship with 3rd Army. He now had an employment method and the liaison officers in place to generate effective cooperation. Teams of four fighter-bombers armed with rockets and bombs rotated over the column, acting on requests from ground commanders or attacking targets of opportunity up to thirty-five miles ahead. Because of communication and close proximity, air and ground units effectively coordinated their actions, using a "bomb line" to mark the division between artillery and Interdiction. As opposed to operations in North Africa, 9th Air Force fighter-bombers talked to ground forces rather than simply loitering overhead for protective cover or standing-by in the rear.<sup>31</sup> Weyland assigned an entire fight-bomber group to support each division's combat commands, even though this violated the centralization tenet of AAF doctrine.<sup>32</sup> Moreover, the XIX TAC would perform many unorthodox missions, such as defending bridges and screening flanks.<sup>33</sup>

Though the Allies had air superiority over France by the summer of 1944, the Luftwaffe still managed raids on allied troops and airfields. Additionally, the Germans employed significant light flak near the front lines, creating a significant threat to

tactical aircraft.<sup>34</sup> Despite the flak and ground fire, however, the loss rate for CAS aircraft was generally less than 1 percent per sortie.<sup>35</sup> The challenge for Weyland and XIX TAC was providing the advancing 3rd Army's with CAS in addition to performing 9th Air Force Interdiction missions, all while continually moving east. Weyland usually allocated half his fighter-bomber groups to direct support of 3rd Army. This consisted of rotating four-aircraft flights above the lead ground units while in constant communication.<sup>36</sup> XIX TAC arranged flights to provide constant coverage of the advancing columns. The other method XIX TAC employed was armed reconnaissance. Groups of ten to twenty-five fighter-bombers flew ahead of the front lines "seeking out possible strong points or pockets of resistance which might hamper the forward movement," while reporting to the ground units any targets located or attacked.<sup>37</sup>

Because of the close cooperation between 3rd Army and XIX TAC, procedures for requesting and controlling air support were streamlined and integrated into operations.<sup>38</sup> This resulted, in part, from placing aviators as far forward as possible, but it also helped that many ground and air officers knew each other from prior Army assignments. Going far beyond contemporary liaison doctrine, Weyland attached a pilot to each 3rd Army maneuver battalion to talk directly to the four-ship fighter-bomber formations. This pilot could also use radar to direct aircraft "down through an overcast to hit the objective, and then vector them back out and up through the cloud deck."<sup>39</sup>

XIX TAC used three primary aircraft for CAS, the P-51, P-38, and P-47. The P-47 performed best because of its durability, slower speed, and large, varied weapons load.<sup>40</sup> Unlike aircraft such as the P-51, the P-47 was air-cooled, meaning it could take damage more readily without quickly overheating. This ability to absorb damage

coupled with armor piercing ammunition made the P-47 a formidable CAS aircraft.<sup>41</sup> Though the aircraft could carry 2,500lbs of bombs, “pilots considered strafing a more effective form of attack, especially against unarmored targets,” a method used today.<sup>42</sup> Ironically, the P-38 and P-47 were designed for air-to-air combat, not ground attack.

Fighter-bombers such as the P-38 and P-47 were able to fly lower than the heavy bombers; the typical fighter-bomber operated from 3000-5000 feet, and often lower when required.<sup>43</sup> Weather minimums for XIX TAC were 1,000-foot ceilings, three miles of visibility with 3,500-foot ceilings for armed reconnaissance.<sup>44</sup> Additionally, lower aircraft were easy for forward air controllers to spot and direct, all while increasing the accuracy of attacking aircraft.<sup>45</sup> Unfortunately, the P-47’s had limited endurance, especially as Allied armies sped through France. Once fielded with external drop tanks, P-47s were a formidable CAS platform.

In support of ground forces, XIX TAC operated in weather that grounded other units. 3rd Army deputy chief of staff, BG Paul Harkins, remarked, “The XIX TAC would fly in weather absolutely forbidden for anybody else to fly in. If a tank cut-out or got damaged in front of the lines and the others couldn’t move, the XIX TAC would come in under cloud cover and [strafe] around until somebody could go and pull the tank out.”<sup>46</sup> Certainly, the close cooperation contributed to XIX TAC’s willingness to push weather, which paid dividends in mid-August as the Germans attempted to escape the Falaise pocket. On August 17, taking advantage of what they thought was poor flying weather, German convoys massed on roads heading east until a flight of XIX TAC fighter-bombers, diving “dangerously low,” discovered them.<sup>47</sup> The sky was soon

full of American fighter-bombers adding to German traffic jams, which XIX TAC called “harvest time.”<sup>48</sup>

As the American air-ground cooperation improved rapidly during the fall of 1944; one Wehrmacht division commander calling the employment of tactical aircraft and artillery “excellent.”<sup>49</sup> While the bomber attacks had rendered much of the French rail system inoperable the previous spring, TAC fighter-bombers forced the German Army to conduct nearly all movements at night. During a post-war interview Field Marshall von Rundstedt, the German commander in France, described the situation: “the attack on the roads and on marching columns, individual vehicles, etc., [made it] impossible to move anyone at all by day, whether a column or an individual vehicle. . . . That also meant that the quick bringing up of the armored [forces.] . . . was impossible.”<sup>50</sup> A Panzer division commander described the impact of the fighter-bombers at Avranches in early August: “they came in the hundreds, firing their rockets at the concentrated tanks and vehicles. We could do nothing against them and we could make no further progress.”<sup>51</sup> Between the advancing armies and fighter-bombers, von Rundstedt said that the Allies were “more or less everywhere at once.”<sup>52</sup>

Hitler’s close associate Hermann Goering also acknowledged the effectiveness of attacks on targets close to the front lines, particularly low-level tactics: “The attacks on Marshalling Yards were most effective, next came the low level attacks on troops and then the attacks on bridges. The low flying airplanes had a terror effect and caused great damage to our communications.”<sup>53</sup> Because of the relentless pursuit of the fighter-bombers, many Germans Soldiers developed what they called, “The German look,” head turned skyward looking for the next P-47, P-38, or other Allied fighter-bomber coming

in to attack.<sup>54</sup> When asked what measures would have “neutralized the Allied air forces,” Generaloberst Heinz Guderian responded simply, “The creation of a better Luftwaffe.”<sup>55</sup>

As 3rd Army advanced, Patton realized that CAS could be as effective and responsive as field artillery.<sup>56</sup> He relied significantly on the XIX TAC to provide the type of flexible support required by a fast-moving combined arms team. Patton ensured Weyland had “full control of the air [units].”<sup>57</sup> Employing aircraft against single targets violated many air power tenets espoused in FM 100-20, but Weyland understood that time was a critical factor for moving ground forces.<sup>58</sup> He explained: “Well, time was of the essence. . . Here, they were moving, so by the time they’d stop a column and deploy their artillery, and whatnot . . . it might take them an hour or two. I’d have fighter-bombers out in front and we’d try to take care of anything.”<sup>59</sup> Tellingly, among 9th Air Force TACs, only the XIX TAC conducted more CAS than Interdiction.<sup>60</sup>

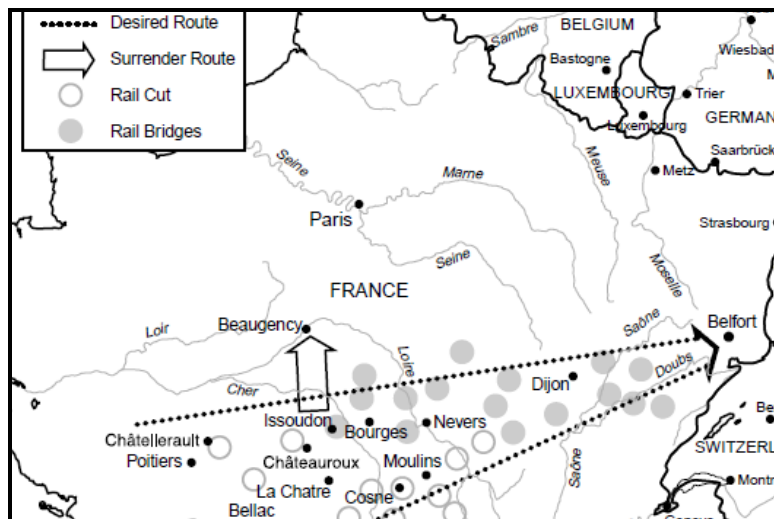


Figure 5. XIX TAC Loire Interdiction Plans

*Source:* Bradford J. Shwedo, MAJ, USAF, *XIX Tactical Air Command and ULTRA* (Maxwell AFB, AL: Air University Press, 2001), 10.

Weyland's opportunity to demonstrate XIX TAC's capability came in August as 3rd Army moved east along the Loire River. Patton intended to move directly east in pursuit of the fleeing Germans. However, various conflicting reports identified 80,000 Germans on 3rd Army's left flank and 90,000 on its right. Patton, undeterred, directed his lead XII corps, "Ignore the bastards, go ahead."<sup>61</sup> In order to facilitate a rapid advance, Patton decided to use XIX TAC to cover his flank, and told Weyland, "I am going to forget completely about my flank, if you can guarantee to protect it for me from the air."<sup>62</sup> "Weyland assured him that if the weather was good, his planes would keep all German forces at least thirty miles from his columns," allowing Patton to focus on his eastward advance.<sup>63</sup> When a reporter asked Patton if he worried about his flanks, Patton responded, "The Air Force takes care of my flanks."<sup>64</sup> To support the 3rd Army's Loire Flank, XIX TAC switched several fighter-bomber groups from column cover to Interdiction, attacking rail and bridge lines to prevent German attacks from the south. While this was not technically CAS, it was closely tied to XIX's support of 3rd Army.

By mid-August, XIX TAC had three jobs: destroy bridges along the Loire, cover the advancing columns, and support VIII Corps, which Patton left in Brittany to mop-up remaining German forces.<sup>65</sup> Weyland had to coordinate these efforts with XIX spread across Northern France; the Allied advance meant some aircraft were operating nearly 200 miles from the front.<sup>66</sup> In addition to armored column cover, XIX TAC conducted "armed reconnaissance" using 20-30 aircraft per mission. These flights turned AAF Interdiction around: "Instead of keeping enemy forces from entering the battle zone, Weyland's fighter-bombers were tasked with preventing troop movements away from

the fighting, keeping them within killing range.” “General Patton also wanted the bridges hit, but to stop the Germans from escaping his grasp—a crucial distinction.”<sup>67</sup>

The other area of critical support provided by TACs was tactical reconnaissance. Though useful, high-altitude photography did not provide the detail that ground units required. Only low-level reconnaissance, utilizing oblique angles provide the required detail.<sup>68</sup> As in CAS, decentralization was crucial to the effort. Reconnaissance teams co-located with division headquarters, quickly moving requests from demand to execution and giving pilots an understanding of what the ground force needed.<sup>69</sup> Patton later remarked on the reconnaissance effort:

Air reconnaissance performed by XIX has successfully provided 3rd US Army with timely and accurate information of the enemy. . . . Photoreconnaissance has been of inestimable value to of this command. The opportunity to make detailed studies of enemy defensive installations as revealed by air photos has afforded all commanders with a most accurate and detailed picture in planning future operations. . . . The utmost has been achieved in the cooperation between ground and air.<sup>70</sup>

In late September, 3rd Army’s rapid advance through France stalled in Lorraine as the entire Allied force reached logistical culmination and encountered stiffening German resistance. For the XIX TAC the slowing advance and worsening weather was a chance to move fighter-bomber groups closer to the front.<sup>71</sup> During the Lorraine campaign, which included the seizure of Metz, XIX TAC flight hours dropped by nearly 50 percent due to the poor weather.<sup>72</sup> With the armored columns slowed, XIX TAC focused on Interdiction to 3rd Army’s front. Patton, never one to favor the defense, forbid 3rd Army to dig in and employed “a thin outpost zone back at suitable places by power mobile reserves.”<sup>73</sup> As in all 3rd Army operations, XIX TAC had the ground plan so it could support the reserve by quickly concentrating “planes upon any critical area in

the most expeditious manner.”<sup>74</sup> Despite the relatively static fighting in Lorraine, the focus on XIX TAC remained direct support of 3rd Army. Fighter-bomber groups on their way to deep targets would still check-in with front-line units and perform missions on demand. Despite the weather, XIX TAC still conducted effective attacks. For example, on October 2 XIX TAC launched 426 sorties, cutting 29 railways, and destroying 243 rail cars at eight marshalling yards.<sup>75</sup> Furthermore, even during this static period, when 3rd Army conducted a month-long series of deliberate attacks to seize Metz, Patton and Weyland elected to employ P-47s whenever precision was required.<sup>76</sup> The bombers of the day, operating from England, were too inaccurate.

The situation drastically changed when the Germans launched a massive offensive through the Ardennes on December 16. The attack took Allied high command by surprise, creating the eponymous “Bulge” in American lines. Patton’s near-immediate response to the bulge and relief are well known, but XIX TAC was instrumental to 3rd Army’s success as well. After telling Allied High Command the morning of December 18 that he would attack within twenty-four hours, Patton met with his corps commanders and Weyland that evening.<sup>77</sup> The close working relationships developed over the previous year were instrumental as each 3rd Army unit and XIX TAC immediately began moving toward Bastogne with a minimum of planning.<sup>78</sup>

XIX TAC responded immediately by attacking marshalling yards, aided by IX TAC, which provided Air Superiority, shooting down 34 Luftwaffe planes.<sup>79</sup> As 3rd Army turned north toward Bastogne, XIX TAC returned to the armored column cover tactics used in August and September. The weather inhibited flying and the XIX TAC re-tasked some fighter-bombers to provide air cover against enemy fighters, but over



seventy sorties still supported the advance.<sup>80</sup> When the weather cleared on 22 and 23 December, XIX TAC launched over 500 sorties each day, destroying fifty enemy aircraft, dropping over 200 tons of bombs, destroying fifty tanks and nearly 1,000 motor vehicles at the cost of fifteen aircraft.<sup>81</sup> From 24-27 December, as 3rd Army relieved Bastogne and drove the Germans back to the East, XIX TAC flew 2,300 sorties, destroying 2,200 vehicles, over 300 tanks, and nearly 500 railcars. Despite flying armed reconnaissance in the Bulge, covering armored columns, and protecting 3rd Army's eastern flank during atrocious weather and an active enemy, XIX TAC sortie rate for the five-day period was among its highest of the war.<sup>82</sup> By the end of this period, it was difficult for Allied pilots to find targets during daylight as the Germans retreated.<sup>83</sup> Generaloberst Alfred Jodl, chief of Wehrmacht operations, later stated, "We still had lots of material and sent it to the front in hundreds of trains, but the trains got there only after weeks or not at all."<sup>84</sup>

The relief of Bastogne, though not the last campaign of the war, demonstrated the high degree of trust and competence that existed between 3rd Army and XIX TAC. With little time to plan and only a basic understanding of the situation, the air-ground team responded effectively and rapidly in order to blunt and then destroy the Wehrmacht advance. During this period, 3rd Army and XIX TAC relied on the close cooperation developed throughout 1944, but just as importantly, the commands were co-located, which allowed for mutual understanding of the situation and personal communication. All of these elements were vital to their success.

## Korean War

The Army emerged from WWII with combat-proven divisions, corps, and armies capable of maneuver, fire support, and worldwide logistics. It also had complementary air force, consisting of separate tactical and strategic air forces comprising over two million men arranged in over 200 fighter, bomber, or reconnaissance groups.<sup>85</sup> In August 1945, the Army Air Forces (AAF) contained over 63,000 aircraft, including 13,000 heavy-bombers, 5,000 medium-bombers, and nearly 17,000 fighters.<sup>86</sup>

During the war, AAF tactical leaders such as Generals Hoyt Vandenberg, Pete Quesada, and Otto Weyland understood the limitations of their aircraft and that their primary role was to support the ground forces commander through proximity to and close coordination with ground commanders.<sup>87</sup> By the war's end, the AAF comprised nearly a quarter of the Army's total strength, but the air forces—at least the tactical air forces—ultimately served ground commanders.<sup>88</sup> Unfortunately, understanding of the importance of proximity, mutual understanding, and close cooperation was lost with the erecting of a bureaucratic wall between the services in 1947.

Though the 1947 National Defense Act created the Air Force, the 1948 Key West Agreement actually laid out the roles and missions of the services.<sup>89</sup> In addition to losing the AAF, the Key West directed that the Army Ground Forces (AGF) transfer nearly all of its 1,600 hundred observation and light transport aircraft to the USAF.<sup>90</sup> Tactical air power, including CAS, became Air Force functions. During WWII, cooperation between fellow Army officers bridged any gaps between the AAF and the AGF. After the 1947, that gap became a gulf.

Korea represented the first major conflict in which the USAF participated as an independent service. US air power was generally unprepared to respond to the North Korean invasion. Despite having developed comprehensive air doctrine during WWII, each service “went home and wrote separate doctrinal manuals.”<sup>91</sup> Joint air exercises between 1947 and 1950 as well as the 1949 Joint Tactical Air Support Board were designed to improve Interservice coordination, but no agreed-upon doctrine existed.<sup>92</sup> In Korea, all aircraft in should have fallen under the Far East Air Forces, but Navy/Marine aircraft, USAF fighters, and USAF bombers all remained separate.<sup>93</sup>

The 1947 establishment of the USAF as an independent service explains much of the Army-Air Force friction in Korea. The independence of the Air Force created a bureaucratic wall between the Army and the USAF, reducing cooperation and nearly eliminating proximity—though the Air Force arguably thought this was a benefit of autonomy. During WWII, while there were significant disagreements, air and ground leaders and their staffs generally worked together at each echelon from battalion to field army.<sup>94</sup> In Korea, communication technology was much better, but the air commander was now from a separate service. Nearly all coordination and support took place from afar via messages and field phones. Additionally, while WWII commanders in Europe arrived in 1944 with a clear distinction between the roles and missions of tactical and strategic air forces, in Korea the USAF conducted air superiority, Interdiction, and CAS simultaneously. Moreover, no tactical air organization focused on ground operations like the TACs existed in Korea. While Air Force liaison units aligned with Army division and corps, requests had to process through multiple Army and USAF channels prior to

aircraft launching or diverting, creating significant delays.<sup>95</sup> Lastly, the 5th Air Force had little CAS training due to its focus on defending Japan from a Soviet Invasion.<sup>96</sup>

The remote distance of air units from the fight created confusion, delay, and poorly synchronized efforts, inevitably leading to animosity between the services. In Korea, the USAF intended to prove the effectiveness of independent air operations. After the Inchon landings, a major split erupted when the Supreme Commander, GEN MacArthur, placed Marine Aviation under the Air Force. LTG Almond, the commander of X Corps, was generally dissatisfied with the CAS performance of the Air Force and requested that Marine Aviation remain under his control.<sup>97</sup> When MacArthur denied this request, Almond accused the Air Force of exercising one-way flexibility, pulling CAS sorties to perform Interdiction, but never for CAS.<sup>98</sup> Almond identified four points of conflict, all of which persist today: lack of a dedicated CAS Aircraft; deficiency in communication between aircraft and ground commanders; disagreement between the effectiveness of CAS vs. Interdiction Attack; and the air-ground C2 relationship.<sup>99</sup> As opposed to the loose control exercised in WWII, in Korea the Army had to obtain USAF approval at each level for even minor targets.<sup>100</sup> Although the FAC(A) system helped, the system increased the workload for Army staffs and created interservice animosity.

Almond specifically argued against the use of jet aircraft in a CAS role, stating, “Although the Marine aircraft and Air Force propeller planes were generally adequate, the jets were not. Jet sorties had to be released frequently because of the lack of endurance. . . . However, higher speed and limited endurance made them less accurate and more proven to make tragic errors in target identification.”<sup>101</sup> In fact, F-80, America’s first jet fighter, could not carry bombs until retrofitted, clearly demonstrating

USAF priorities.<sup>102</sup> While the Air Force eventually fielded external fuel tanks, jets still had limited endurance late into the war because they flew from Japan rather than primitive Korean airfields.<sup>103</sup> The mountainous terrain of the Korean peninsula also contributed to the difficulties by inhibiting inadequate communications equipment and preventing visual control over fast moving jets.<sup>104</sup>

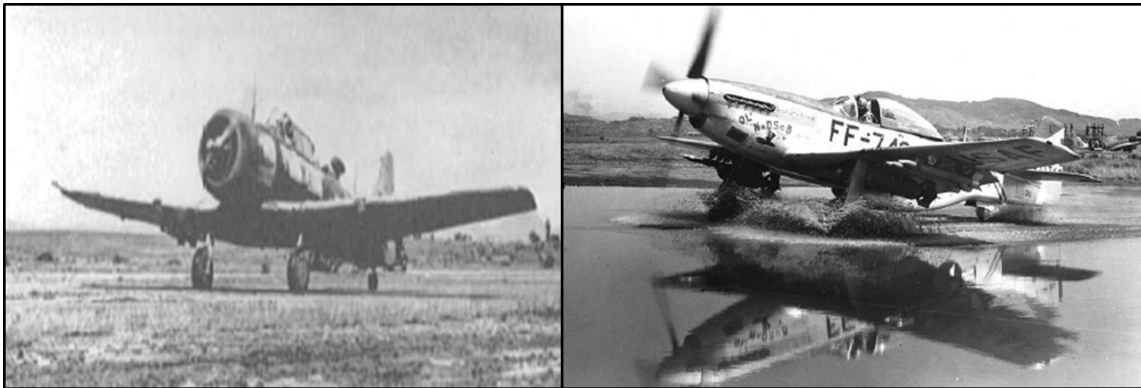


Figure 6. T-6 FAC and CAS F-51 at Forward Landing Strips in Korea

*Source:* Allan R. Millett, “Korea, 1950-1953,” in *Case Studies in the Development of Close Air Support*, ed. by Benjamin Franklin Cooling (Washington, DC: Office of Air Force History, 1990), 367; Steve Tittel, MAJ, USAF, “Cost, Capability, and the Hunt for a Lightweight Ground Attack Aircraft” (master’s thesis, Army Command and General Staff College, 2009).

To help, in July 1950, the Air Force fielded propeller-driven aircraft for service as Airborne Forward Air Controllers (FAC(A)).<sup>105</sup> FAC(A)s were first used in Italy during 1943; known as “Rover Joes,” they supported on-call CAS and coordinated strikes when “pilots did not have sufficient time before the mission to understand the situation.”<sup>106</sup> In Korea, the USAF required the individual directing strike aircraft to be a rated pilot, but, in practice, this did not always occur. Nevertheless, by the end of the

war, FAC(A)s had controlled “90% of Air Force CAS sorties”<sup>107</sup> The T-6 could sprint at 210mph, fast enough to evade enemy fighters, yet it could slow to provide effective on-scene coordination with ground units.<sup>108</sup> Additionally, the T-6 could take-off in just 700 feet from a dirt runway, allowing basing near the front.<sup>109</sup>

The use of propeller driven aircraft was not limited to FAC(A) operations. Generally, ground commanders preferred propeller-driven aircraft like the F-51 for CAS.<sup>110</sup> In the late summer of 1950, the Air Force rapidly switched six F-80 jet squadrons to F-51s, upgraded WWII P-51s removed from storage.<sup>111</sup> F-51s operated from rugged forward bases, had longer loiter times, and a large, varied ordnance payload.<sup>112</sup> The F-51’s slower speed aided target identification, which had the salient benefit of reducing risk to ground forces. The F-51 was never an ideal CAS platform due to its vulnerability to ground fire, but relative to jets it performed well because it had long loiter times.<sup>113</sup> Propeller aircraft provided long loiter times partially due to forward basing in Korea as well as lower fuel consumption.

The importance of operating near the front and the close cooperation it created was demonstrated when GEN Earle Partridge, commander of the 5th Air Force, flew GEN Walton Walker, commander of the 8th Army on a reconnaissance flight in November, 1950 during the Chinese counterattack. Partridge flew Walker in his T-6 nearly to the Yalu River before landing at a forward headquarters, where he ordered an immediate withdrawal.<sup>114</sup> Before helicopters, this type of personal air reconnaissance was only possible in aircraft like the T-6.

The performance of legacy aircraft seemed particularly good in light of the limited station time provided by Air Force’s primary fighter, the F-80. Flying to Korea

from Japan, F-80s often had station time measured in minutes, as opposed to T-6's hours. T-6s performing FAC(A) duties were nearly always over the front, while the jet fighters "came in spurts."<sup>115</sup> Of course, using legacy aircraft was only possible with Air Superiority.<sup>116</sup> However, disagreements persisted concerning CAS C2 and priority.

In Korea, the Air Force focused its efforts toward Interdiction and strategic targets. Army and Marine ground commanders wanted CAS placed ahead of Interdiction. They also objected to what they perceived as an overly rigid CAS structure. Air Force commanders wanted at least twenty-four hours to schedule CAS because they viewed airborne alert as a waste of aircraft; this was anathema to Army units responding to Chinese and North Korean attacks.<sup>117</sup> Unsurprisingly, the enemy did not broadcast their intentions. Army commanders considered CAS during planning, but their main complaints involved the response time to unplanned events. Far from a day's notice, the Navy-Marine Corps system recognized the need for rapid response.<sup>118</sup>

While the Air Force insisted on a "Pull-CAS" system in which requests moved through regiment, division, and corps headquarters to the USAF air coordination center, the Navy-Marine system used a "Push-CAS" system, sending aircraft forward where FAC(A)s or ground controllers distributed sorties.<sup>119</sup> The Army-USAF system required approval at each echelon, increasing the delays, whereas the Navy-Marine system operated on a system of negation, shifting aircraft unless explicitly denied. "By eliminating the requirement that intervening ground force headquarters process requests, and by placing aircraft on station on regular schedules, the Marines ensured that strikes arrived a few minutes after [the request]."<sup>120</sup> GEN Almond summarized the Army's distaste for this system:

The chief objection I had to the support that we received in Northeast Korea was the. . . desired notification of tactical air support requirements 24 hours in advance. . . . Our requirements for immediate air support were not always predictable 24 hours in advance; we needed an Air Force commitment to respond to unplanned tactical air support requests within 30–50 minutes.<sup>121</sup>

In December 1950, Almond's X Corps released a report contrasting Air Force and Marine CAS. The report harshly criticized the Air Force and recommended "Field Army or separate corps commanders [have] operational control over supporting tactical air units."<sup>122</sup> Almond was not alone in his criticism. LTG James Van Fleet, commander of 8th Army, wrote to GEN Ridgway, "I feel that I express the reaction of all ground commanders from company to corps level when I state that [CAS] in this theater has not been developed to the degree which ground commanders anticipated."<sup>123</sup>

Table 1. X Corps Report (Air Force vs. Marine CAS)		
Factor	Marine Air Wing	5th Air Force (USAF)
Type of A/C	Designed for tactical air support	Designed for fighter missions primarily
Mission	Tactical air support its primary mission	Tactical air support not higher than third priority as mission
Training	Extensive air-ground training, complete familiarity, and understanding of supported unit tactics	Virtually no air-ground training initially, but methods of supporting ground units are now under development
TACP's	One per Battalion – 13 per Div	One per Regiment – 4 per Div
Control	Senior ground commander in operational control	Senior Air Force commander in operational control, cooperation with senior Army commander
Organization	Designed for tactical air support down to Battalions	Designed primarily for missions other than tactical air support. No specific allocation of number of squadrons per army or corps
Communication	Simplified, local	Complicated, insufficient

*Source:* Reproduced from X Corps, "Army Tactical Air Support Requirements and Trends in Air-Ground Methods" (Korea, December, 1950), accessed April 28, 2015, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll11/id/1571>.



The X Corp's report bluntly criticized the use of jet fighters, designed for air-to-air combat, in a CAS role, stating, "It is unreasonable to expect that aircraft designed for fighter missions can be employed as efficiently in tactical air support as aircraft designed for [that role]." <sup>124</sup> X Corps recommended an increase in the number of Tactical Air Control Parties (TACPs), from regimental to battalion allocation, along with better joint training. The report called for aircraft designed primarily for "tactical air support" and giving army and corps commanders "operational control over supporting tactical air units." This directly challenged the Air Force's autonomy in Korea. <sup>125</sup>

To improve the situation, USAF Chief of Staff GEN Hoyt Vandenberg dispatched MG Otto Weyland to Korea to serve as vice-commander and, later, commander of the Far East Air Forces (FEAF). His expertise and experience employing tactical airpower was well known and he had an effective personality, allowing him to negotiate with temperamental commanders such as MacArthur and Almond. His efforts resulted in an improved tactical air control system that enabled ground units to rapidly request support and effectively communicate with aircraft. <sup>126</sup>

By war's end, this system utilized division-level Air Liaison Officers (ALOs) to plan CAS sorties and control missions arriving in each unit's sector, often to great effect. <sup>127</sup> Weyland's efforts improved the interservice coordination, particularly with the separate X Corps. Almond had previously described the liaison and communication between the air operations center and X Corps as "practically non-existent." <sup>128</sup> However, the services still strongly disagreed about the importance and priority of immediate versus pre-planned requests. The Air Force wanted seventy-two hours of notice—dictated by the ATO process—for missions while the Army desired immediate response.

This caused heartburn for Army leaders since the weather—not to mention the enemy—had a vote in altering their plans with little notice.<sup>129</sup>

Almond's criticism was valid but excessive. The Air Force—with duties across the entire peninsula to include Air Superiority—could not provide the dedicated CAS that the Marines could, simply due to the size of the relative areas. For his part, Weyland overstated the ability the Air Force to decisively influence the war, telling Vandenberg in 1951 that Korea “offered [an] unparalleled opportunity to show how tactical air power could win a conventional war.”<sup>130</sup> In reality, air power could stop the Chinese invasion, which occurred, “in the teeth of everything that the Americans could do.”<sup>131</sup>

The Army and Air Force began the Korean War with sound joint doctrine. What led to the majority of issues was Army's lack of training air-ground integration and the decline in Air Force tactical airpower, both a function of focusing on nuclear warfare. On arriving in Korea, Weyland was dismayed, remarking: “What was remembered from [WWII] was not written down, or if written down was not disseminated, or if disseminated was not read or understood.”<sup>132</sup> There were issues from both sides of CAS, each serving as illustrations of the “drawbacks of both overly air-centric and overly ground-centric command relationships.”<sup>133</sup> Furthermore, the poor utilization of B-29 bombers by MacArthur's staff hampered USAF efforts.<sup>134</sup>

The Army and Air Force ended Korea with diverging views on CAS. The Army essentially believed “lower-priority missions received only minimal support [and] the lessons of World War II had been forgotten.”<sup>135</sup> Leaving the conflict, the Air Force believed Army leaders like Almond prevented an effective Interdiction campaign.<sup>136</sup> By the end of the war, most senior ground commanders, including Ridgway, were pleased

with USAF CAS. MAJ Michael Dolan, the 2nd Infantry Division, Air Operations (G-3 Air) Officer, provided a balanced view of CAS during the war's final year:

There has been too much loose talk; too much fiction and not enough fact in newspaper reports on tactical air support of infantry units in the Korean theater. Some descriptions of air participation in ground combat give the impression that the fighter aircraft alone won the battle, while still others take the opposite tack . . . The answer to just how effective [CAS] in Korea has been lies somewhere in between these conflicting reports. Air power alone has not won a single action against ground troops, but the infantry will be the first to rise up and state that the combination of [CAS] plus on-the-ground fighting of determine GI's has won many a fight. . . . Close tactical air support of ground forces, after a slow start, has come of age. Hard-bitten infantry regimental commanders have accepted the doctrine of tactical air in their stride and have learned to fit the new concept into their scheme of maneuver.<sup>137</sup>

In order to determine the means and organization of support that the Air Force would provide to the Army and, to a lesser extent, the Marines, the Chairman of the Joint Chiefs directed that the Air Force establish a Joint Tactical Air Support Board (JTASB) in 1951, in the midst of the Korean War. Respective service boards supported the joint board. The Joint Chiefs charged the JTASB to evaluate tactical air support in terms of "doctrine and procedures," "tactics and techniques," and "adequacy of equipment."<sup>138</sup> The JTASB received input from WWII commanders, Army, and USAF Chiefs of Staff, as well as field reports from Korea. While the JTASB resulted in some agreement "the same divergence of views at the highest level of authority, which mitigated against a resolution of the problem, are manifestly evident at the lower echelons because of disseminated service positions on such controversial matters."<sup>139</sup> This manifested most evidently as disagreement regarding CAS priority and importance.

Despite the substantial progress made in Korea, the Air Force failed to "translate novel, effective solution to a tactical problem into organization, personnel, and equipment, necessitating 'reinvention' of the solution."<sup>140</sup> In five major joint exercises

after the war, the same Army-Air Force issues reappeared: “[The Army] did not like the requirement to send air requests through the chronically undermanned, undertrained, and marginally equipped air-ground operations system.”<sup>141</sup> Regardless, the Air Force did not procure a CAS-specific aircraft. A CAS aircraft would have likely resolved the Army-Air Force debate, regardless of operational control. MAJ Dolan’s report to the JTASB echoed this sentiment: “With the [CAS] equipment problem solved, and with well trained personnel skilled in the use of close tactical air support, the ground forces will truly have at their disposal a potent weapon. A weapon that combined with armor, artillery, and infantry will give the United States found tactical aces in the game of military strategy.”<sup>142</sup> A CAS aircraft would not come about for another twenty years after Korea. If anything, the Air Force viewed CAS more negatively after Korea, and showed it by disbanding the 6147th Tactical Group, its only FAC(A) unit, in 1957.<sup>143</sup>

#### Helicopters, the Howze Board, and Air Mobility

Air Force complaints over Army FW aircraft used during the Korean War seemed logical in the nuclear-focused 1950s.<sup>144</sup> Backed by strong political willpower, the Air Force’s Strategic Air Command focused on constant readiness for nuclear war. By 1957, SAC “consisted of 224,000 airmen, close to 2,000 heavy bombers, and nearly 800 tankers,” as well as a sizeable portion of the DoD budget.<sup>145</sup>

However, the Army did manage to carve out some room for its own aviation. The Key West Agreement did not mention helicopters and subsequent Army-Air Force agreements left that avenue open.<sup>146</sup> Dissatisfied with the Air Force’s CAS performance in Korea, the Army exploited gaps in the DoD agreements, fielding its own aircraft below agreement weight limits as well as helicopters.<sup>147</sup> A 1956 agreement directed by

Secretary of Defense Charles Wilson endorsed Air Force's view, allowing Army aviation, but not for CAS, tactical reconnaissance, and Interdiction (Appendix A).<sup>148</sup> Surprisingly, the Air Force, in conjunction with the Wilson Memorandum, issued a statement encouraging Army development of aviation for support functions such as internal airlift, aeromedical evacuation, survey, and C2.<sup>149</sup>

As the 1950s progressed, the Army sought increased organic mobility through airpower. In 1954, LTG James Gavin spurred the Army to consider the helicopter as an answer to its mobility problems in a Harper's Magazine article, "Cavalry, and I Don't Mean Horses." In the article, Gavin extolled the Army to embrace new technologies such as the helicopter to increase its flexibility and mobility. The article concluded with a call to action: "If ever in the history of our Armed forces there was a need for the Cavalry arm - airlifted in light planes, helicopters, and assault type aircraft - this was it."<sup>150</sup> At the height of the Cold War, with the focus on large-scale nuclear warfare, Gavin was out of step with prevailing views, but his vision proved prophetic.

Between 1957 and 1962, the Army conducted a series of tests on the feasibility of using helicopters to rapidly move troops and equipment.<sup>151</sup> The Air Mobility concept emerged out of these tests. The Army also sought out FW platforms such as the CV-2 Caribou (tactical airlift) and the O/AV-1 Mohawk (CAS), under the weight limits of DoD agreements.<sup>152</sup> While the Air Force tolerated the concept of Army aircraft for Air Mobility, it objected to Army FW aircraft conducting CAS and reconnaissance.<sup>153</sup>

In 1962, Secretary of Defense Robert McNamara, dissatisfied with the available options for tactical mobility and mobile fire support directed the Army to evaluate how it could incorporate helicopters.<sup>154</sup> McNamara was emphatic: "I shall be disappointed if

the Army's reexamination merely produces logistically oriented recommendations to procure more of the same, rather than a plan for employment of fresh and perhaps unorthodox concepts which will give us a significant increase in mobility.”<sup>155</sup>

The Tactical Mobility Requirements Board, known as the Howze Board, after its chair, GEN Hamilton Howze, would not disappoint McNamara. Over eight months the Howze Board conducted forty tests utilizing over 150 aircraft, flying 11,000 hours.<sup>156</sup> The Board's September 1962 report recommended significant operational and organization changes designed to improve Army tactical mobility through the incorporation of helicopters into its formations. The Howze Board concluded simply:

Adoption of the Army of the airmobile concept-however imperfectly it may be described and justified in this report-is necessary and desirable. In some respects, the transition is inevitable, just as was that from animal mobility to motor. [The] Board recommends . . . that the Army structure be modernized [to included] 11 [current] divisions, five operational air assault divisions, three air cavalry combat brigades, strengthened armored cavalry regiments, and provisions for increasing the mobility of other combat units as well as the rapidity and responsiveness of their logistic support.<sup>157</sup>

Adoption of Air Mobility was the “single conclusion of the Howze Board.”<sup>158</sup> To the Army, the Howze Board provided the opportunity to support President Kennedy's “flexible response” and, therefore, re-gain funding and prestige lost during the 1950s.

The immediate results of the Howze Board were two-fold. First, the Army embraced the board's findings, creating a division-sized organization to test and employ the Air Mobility Concepts, the 11th Air Assault Division (Test) at Ft. Benning, GA. Second, the Howze Board's results re-ignited the Army-Air Force aviation turf war. In 1963, Air Force Chief of Staff, GEN Curtis LeMay, espoused the Air Force perspective, proposing, “The Air Force take over all aerial vehicles presently [used] by the Army and provide all of the Army's air support now and in the future.”<sup>159</sup>

In light of substantially differing Army-Air Force views on helicopters, Air Mobility, and CAS, McNamara ordered a review of Army-Air Force CAS in January 1963. The McNamara CAS Boards found consensus on a range of issues including personnel allocation and improved communications systems, but could not agree on the type of aircraft or C2 of CAS.<sup>160</sup> Previewing the modern distinction between CAS and CCA, Army Chief of Staff GEN Earle Wheeler, made a somewhat devious statement in October 1963: “Units of other Services will conduct [CAS] with aircraft that can deliver large volumes of ordnance on call of the ground commander. Aerial vehicles of the Army will conduct *aerial fire support* with aerial vehicles capable of discriminatory firepower in close proximity to ground combat elements.”<sup>161</sup>

The Air Force preferred the type of aircraft that could handle all three tactical air missions. This meant high-performance jet fighter-bombers. To devote money and other resources to a special aircraft designed only for [CAS] seemed inappropriate to Air Force leaders. Nevertheless, Army leaders advocated the development of such an aircraft by the Air Force. They were not at all certain that the high-performance, multi-mission jets could throttle down sufficiently to deliver effective [CAS]. The Army wanted slower aircraft to locate and destroy small, hidden, or fleeting targets and longer loiter time over the target than that of the sophisticated jets. The Air Force argued in favor of the faster response times and heavier ordnance loads of the jets.<sup>162</sup>

The Air Force failed to mention that the faster speeds of jets did not always result in quicker response times because of basing far-off locations like Thailand.

Ultimately, the McNamara CAS Boards were inconclusive. The Army wanted to maximize its organic control over aircraft in order to provide mobility, flexibility, and airborne fire support. The USAF wanted multi-mission jets for air superiority, Interdiction, and CAS and would not produce a CAS-specific aircraft for the Army. The boards were effective in one aspect, however. By crystalizing issues, the boards shaped

the CAS debate through Vietnam around three issues: quantity, aircraft characteristics, and, most importantly, operational control.<sup>163</sup>

These developments meant the Army and Air Force began Vietnam with issues regarding CAS procedures, priorities, and aircraft characteristics lingering from Korea. Though the services did develop a conceptual joint air-ground coordination system that improved coordination, it would not change the issues revealed by the McNamara CAS Boards.<sup>164</sup> Combined with the Army's new Air Mobility doctrine, CAS became an early point of friction in Vietnam because, "On the eve of the American buildup in Southeast Asia, [joint CAS doctrine] was virtually non-existent."<sup>165</sup>

#### Vietnam and Afterward

Vietnam saw the peak of the Army-Air Force rivalry over CAS when early operations were a near repeat of Korea. Though a reasonable assumption was that doctrine and integration improved since Korea, it was not the case as the services continuously argued over prioritization and ownership of air assets.<sup>166</sup> President Johnson's deployment of the 1st Cavalry Division (Air Mobile) in 1965 began major combat operations.<sup>167</sup> In November 1965, the division began search and destroy operations, culminating in the Battle of the Ia Drang, where a battalion task force defeated a North Vietnamese division. The campaign validated Air Mobility and had a profound influence on Army helicopter development.<sup>168</sup> However, Moore's experience demonstrated the need for additional fire support, particularly during the initial assault.

Army leaders like Moore wanted a supplement to their organic artillery, which was less responsive than air-delivered fires and difficult to reposition.<sup>169</sup> The solution developed was the UH-1B Huey Gunship. This platform filled the gap between small



arms, artillery, and CAS as a responsive, organic fire support asset (figure 2). The Huey Gunship was the start of the modern attack helicopter. McNamara endorsed Army efforts over Air Force objections, stating, “Any aircraft of any service which might operate in battle should be armed whenever necessary not only for self-defense, but also to contribute to the success of U.S. forces”<sup>170</sup>

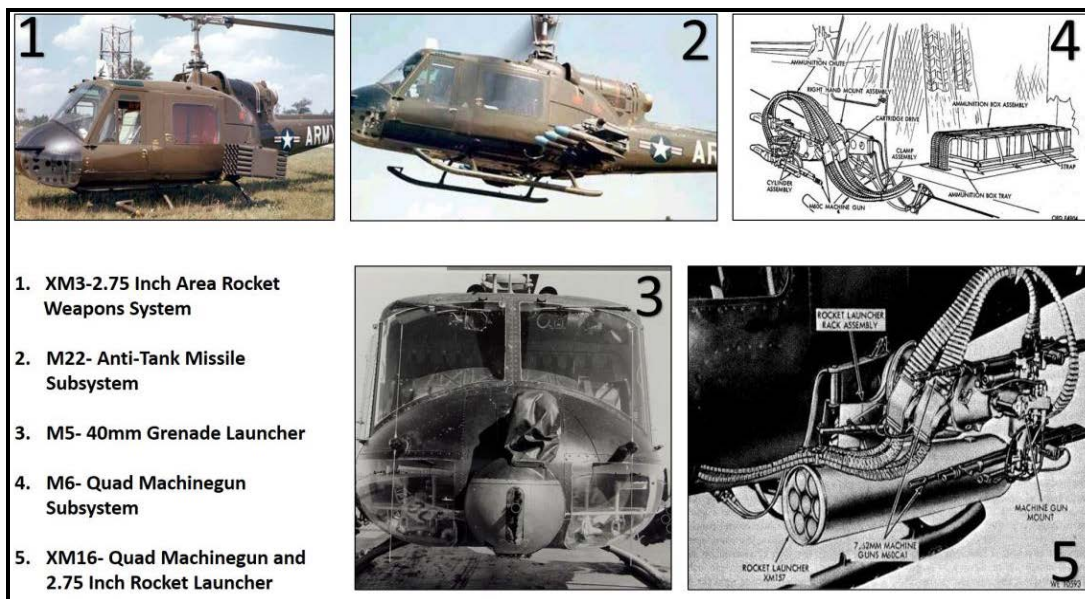


Figure 7. Development of UH-1 Armament

*Source:* Kristopher Gillet, MAJ, USA, “Air Mobility and the Development of Attack Aviation During the Vietnam War from 1965-1967” (master’s thesis, Army Command and General Staff College, 2014).

Air Force support CAS and training support to South Vietnam began in the early 1960s using a combination of American and Vietnamese aircraft.<sup>171</sup> When major combat operations began in 1965, however, there was no overall system to control or coordinate American air power. USAF, Navy, and Marine aircraft operated from disparate locations like Thailand, Guam, and aircraft carriers conducted missions with little coordination.

When large, conventional Army units arrived, the Air Force found itself overwhelmed by the number of CAS requests and the inability of its high-performance aircraft to perform CAS. Jets were too fast for CAS. Pilots could not identify targets and controllers had difficulty spotting the faster, higher jets. Moreover, jet pilots trained in air-to-air combat had difficulty with CAS, specifically target discrimination.<sup>172</sup>

To accommodate the demand the Air Force “borrowed 25 L-19 light observation aircraft from the Army to serve as FAC(A)s” as well as A-1 Skyraiders from the Navy.<sup>173</sup> Additionally, the emerging large-scale ground operations “were not coordinated with air activities, and tactical airlift aircraft flew through tactical air strikes.”<sup>174</sup> Much of the C2 problems were resolved by the “Concept for Improved Joint Air-Ground Coordination” agreement signed in April of 1965. The agreement formalized the procedures for the allocation of tactical air resources and assigned responsibility for liaison officers to the Army and the Air Force, enforcing a basic concept of Joint Operations.<sup>175</sup> The agreement made the USAF CAS request process clear, though Army commanders still wanted more say in the allocation and control.

The arrival of the helicopter and, eventually, the helicopter gunship changed the nature of warfare and CAS in particular, leaving Vietnam forever known as the “Helicopter War.” Regardless of what they called it, “Army commanders quickly realized they had their own organic CAS.”<sup>176</sup> Most Army pilots were armor, infantry, or artillery officers and lived with or near ground units, ensuring close cooperation.<sup>177</sup>

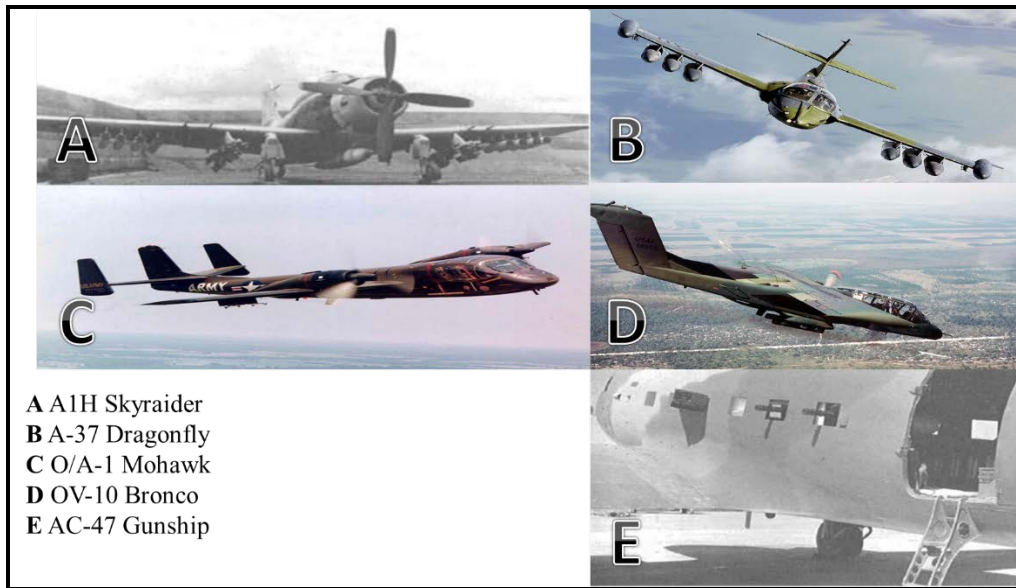


Figure 8. Legacy Aircraft Used in Vietnam

*Source:* Created by author from John Sbrega, “Southeast Asia,” in *Case Studies in the Development of Close Air Support*, ed. Benjamin F. Coolidge (Washington, DC: Office of Air Force History, 1990), 415-417; Steve Tittel, MAJ, USAF, “Cost, Capability, and the Hunt for a Lightweight Ground Attack Aircraft” (master’s thesis, Army Command and General Staff College, 2009).

As the Army continued developing armed helicopters, the Air Force fielded more aircraft to meet the demand for CAS, which the service’s jets could not meet. Like Korea, the Air Force regarded these substitute aircraft as older, slower, and unglamorous—meaning propeller-driven—but they were ultimately more effective in a CAS role.<sup>178</sup> By 1969, the Air Force was using the OV-10 Bronco, developed by the Army, and the A-37, a modified jet trainer, for CAS and FAC(A) duties.<sup>179</sup> Additionally, the aging C-47 transport aircraft became a CAS gunship, sporting miniguns, and illuminating flares.<sup>180</sup> This concept eventually developed into the AC-130 gunship.

A telling case of the relative performance of jet and propeller aircraft performing CAS occurred in March 1966 at A Shau, an isolated Special Forces base in Vietnam’s

central highlands. On 9 March, a detachment of seventeen Americans and 300 Chinese Nung and Vietnamese irregulars found themselves under a massed, coordinated night attack by two battalions of the North Vietnamese 325th infantry division.<sup>181</sup> Because of a low 300-500-foot ceiling amid 1,500-foot mountains, air support was difficult. The first aircraft to arrive was a single AC-47 that broke through the clouds only to immediately receive North Vietnamese ground fire and crash.<sup>182</sup> MAJ Bernard Fisher, leading a flight of two A-1E Skyraiders responded to the distress and subsequently led another flight of A-1Es, a CH-3 MEDEVAC helicopter, two C-123 cargo planes, and a flight of B-57s—a twin-engine tactical jet bomber—through the overcast.<sup>183</sup>

Jets could not penetrate the overcast without Skyraiders leading the way. Additionally, the longer loiter time of the Skyraider enabled MAJ Fisher to stay on-scene and performing FAC(A) operations, controlling arriving aircraft as the attack on the compound continued. Overnight the air support provided to the besieged defenders of A Shau was minimal because of a low ceiling, though Marine jets did conduct radar bombing utilizing beacons on the ground to assist in guiding them.<sup>184</sup> At A Shau CAS demonstrated its importance, but only through its absence, which allowed enemy attacks.<sup>185</sup> The next day MAJ Fisher and another Skyraider were once again under the overcast ceiling providing multiple gun and rocket attacks along the walls of the compound, doing CAS work the jets could not.

Jets were generally more survivable than propeller aircraft, particularly if enemy jets or sophisticated air defense systems were present. However, since in both Korea and Vietnam the Air Force obtained early Air Superiority, this was a moot point with respect to CAS effectiveness. A 1968 survey for the Joint Staff summarized the relative

performance of jets and propeller aircraft during operations in Laos, stating, “The particular type of aircraft used, therefore, becomes a trade-off between the ability to survive and the ability to accomplish the mission with maximum effectiveness.”<sup>186</sup> Though jet aircraft were more survivable, they were also nine times less effective than propeller driven aircraft, who achieved accuracy “by using low-altitude tactics and low-altitude diving deliveries.”<sup>187</sup> Low altitude increased accuracy by allowing the pilots to identify the target while simultaneously reducing both release range and time of flight. This practice helped pilots increase their effectiveness against enemy forces attempting to use terrain for cover. Unfortunately, the low altitude tactics exposed them to fire. While the report acknowledged that “slow speed characteristic of current propeller aircraft [makes] makes them more effective against [vehicles] it concluded that there was a trade-off between ground attack effectiveness and survivability.”<sup>188</sup>

Two noticeable improvements to Army-Air Force CAS during Vietnam were the standardized deployment of TACPs and a better C2 system. Because of a 1965 agreement, the Air Force fielded TACPs to Army units down to the battalion-level.<sup>189</sup> As opposed to the ad-hoc system used in Korea, in Vietnam, the USAF provided enough TACPs to Army divisions request and control CAS effectively, permitting daily allotments while supporting on-demand requests. Additionally, the services cooperated on the employment of FAC(A)s, often using Army aircraft like to OV-2.<sup>190</sup>

In 1968 the overall commander in Vietnam, GEN William Westmoreland made “one of his most difficult decisions,” when he created a single air operations manager.<sup>191</sup> Though the system excluded Army and Marine helicopters, as well as some airlift platforms, it placed the USAF in charge over CAS allocation in addition to Interdiction

and airlift. While the Army and Marines protested the change, USAF leaders were elated, reasoning, “The single-manager system incorporated the fundamental principles of sound organization, such as unity of command, span of control, functional grouping, delegation of authority, and rapid decision making.”<sup>192</sup> Ironically, the Army wanted central control as well, in order to increase the “habitual availability” of CAS to each ground commander—in much the same way as the modern Army CAB.<sup>193</sup>

However, a problem with the centralized system is that it was “producer” and not “consumer” oriented; to accommodate CAS, the USAF tasked sorties to various holding points, to be directed at the request of ground commanders while also demanding ground units submit pre-planned requests three days out.<sup>194</sup> The Marines vehemently objected to this as it disrupted a system developed in Korea and failed to respond adequately to the needs of the ground commander. Rather than tailoring aircraft to ground mission requirements, whatever aircraft were available—regardless of weapons or capabilities—were diverted to the point of request with little to no knowledge of the tactical situation. As evidence of system of diverted or “push” CAS, in the three-month period before the centralized system, Marine commanders had only 5 percent of CAS requests filled by diverting aircraft, where as in the same period afterward the percentage climbed to 77 percent.<sup>195</sup> While diversions met the intent for CAS, the pilots often lacked knowledge of tactical situation or familiarity with ground units.

GEN William Momyer, commander of USAF units in South Vietnam in 1966-1968, noted, “I suppose the significant lesson from Vietnam is the unrealism on the amount of close air support any given ground force commander received regardless of need.” By the end of the war, however, CAS—Army and Air Force—was outstanding.

One Army battalion commander remarked, “Actually, it’s the best that I have ever seen, having fought as an enlisted man in WWII, as a company commander and a platoon leader in Korea. It was probably the most responsive and finest that I could imagine.” American forces became accustomed to overwhelming airborne fire support in Vietnam.

The USAF was dissatisfied with the overall application air power in Vietnam. At no point were all aircraft in the theater under a single commander until 1968 and even then it was only a managerial role. Furthermore, the bombing of North Vietnam was separated within the Air Force, between bombers in Guam and the fighters in Vietnam and Thailand.<sup>196</sup> Regardless, the system that emerged in Vietnam was not doctrinal and, therefore, not readily adaptable. Momyer, while praising the overall tactical air system, remarked, “The present air control system has grown up in the absence of a framework of doctrine for the conduct of tactical operations.”<sup>197</sup> While the control issue seemed settled, the prominence of helicopters re-opened issues regarding CAS.

Army helicopters, which doubled to more than 5,000 during the war, created major issues when they became armed. Armed helicopters were effectively performing CAS, ostensibly an Air Force function.<sup>198</sup> The doctrine debate over helicopters grew until 1966 when the services compromised (Johnson-McConnell Agreement). “In return for the Army’s fixed-wing transports, the Air Force had conceded most of the field of possible operations for rotary-wing aircraft, including direct fire support.”<sup>199</sup> In fact, the Army had seen the proverbial light in the form of helicopters. The helicopter gave the Army organic airborne fire support. By 1967, the first attack helicopter, the AH-1 Cobra, was operating in Vietnam, performing Army “direct aerial fire support.”<sup>200</sup>

To the Air Force, this was CAS and an infringement on its roles and missions. The Air Force was correct; helicopter gunships performed CAS, regardless of the Army definition. Justifiably, however, the Army wanted and obtained airborne fire support organic to its formations as a stopgap measure that expanded greatly in Vietnam. Although “World War II seemed to settle the issue of whether [ground or the air commanders] would control the use of tactical air; the instinctive Army desire to control all resources contributing to the conduct of the ground battle persisted strongly, and Army aviation experienced a remarkable growth from about 200 puddle jumpers in 1947 to more than 12,000 aircraft of various types in 1971.”<sup>201</sup>

Once the Army saw the effectiveness of helicopters in Vietnam, it is hard to imagine the Army giving them away. Further eroding the Air Force’s turf was McNamara’s declaration that all combat aircraft, including helicopters, would be armed, regardless of service.<sup>202</sup> The Army viewed “helicopter gunships merely as occupying one point in a spectrum of escalation from the infantry’s personal arms to Air Force tactical aircraft.”<sup>203</sup> To the Army, rotary-wing (RW) aviation was a continuation of CAS support, albeit one owned and controlled by the Army. A 1966 study by Air Force Chief of Staff GEN John P. McConnell echoed this sentiment, stating, “There was an actual gap in USAF aircraft capabilities to perform the helicopter escort and suppressive fire roles. The Army had abridged this gap by arming helicopters to provide suppressive fire which could force the enemy to remain under cover.”<sup>204</sup> Of note is the escort role; while not strictly CAS, it was similar enough that, according to the Army, a CAS platform should be capable of escorting helicopters and vice versa.



After Vietnam, the Army incorporated helicopters into its permanent formations, their the doctrinal role was still unclear. In 1972, after much difficulty developing the AH-56 Cheyenne, the Army cancelled the helicopter after the Air Force promised to develop an aircraft specifically for CAS. Thereafter all the services convinced Congress to fund new CAS aircraft during debate on the A-10, AV-8B, and AH-64 programs.<sup>205</sup> Congress was concerned about overlap between the programs and Congressional hearings exposed deep, persistent inter-service disagreements regarding CAS.<sup>206</sup> The Air Force developed the A-10 to demonstrate its commitment to CAS, but also to deter Army development of FW attack aircraft. “There is a fair amount of evidence to indicate that the USAF did not plan to use the A-10 for any other purpose than to kill the [Cheyenne]—to keep the Army out of the CAS mission.”<sup>207</sup>

The Army never fully embraced the Howze Board recommendations regarding the multiple Air Mobility Divisions. Nor did it keep the Vietnam-era formations that merged aviation and maneuver into tactical units. However, the Howze Board and Vietnam guaranteed helicopters would remain integral to Army operations.

### AirLand Battle and Modern Air Power Theory

The late 1970s and early 1980s saw major shifts in Army doctrine as the service put Vietnam in the past and focused on defeating the Soviet Army. The Army developed and implemented new doctrines focused on maneuver as a means to counter presumed Soviet strengths, namely AirLand Battle in the 1982 edition of FM 100-5 *Operations*.<sup>208</sup> AirLand Battle “envisioned an integrated battle space” combined with equipment and technologies that would allow the Army to “attack Soviet forces in depth while retaining the capacity for maneuver.”<sup>209</sup> AirLand Battle moved the Army away from attritional-

based thinking, instead promoting tenets of “initiative, depth, agility, and synchronization.”<sup>210</sup> The authors of AirLand Battle initially considered relying solely on Army helicopters instead of USAF CAS. However, COL Huba Wass de Czege, the primary author of AirLand Battle, hesitated because, “I saw the need to be able to rapidly concentrate air support against massed Soviet armor.”<sup>211</sup> The final draft of FM 100-5 stated, “The Army cannot win the land battle without the Air Force.”<sup>212</sup>

AirLand Battle dictated a broader view of the battlefield, which necessitated major Army-USAF cooperation during a war with the Soviet Union. To accommodate this, in 1983 Army Chief of Staff GEN John A. Wickham teamed with Air Force Chief of Staff GEN Charles A. Gabriel, creating a team that bypassed regular channels to present recommendations for “mutual force development, cross-service budgeting and programming procedures” along with tactics. The service chiefs adopted thirty-one of the recommendations (Appendix A) and the Air Force reaffirmed its commitment to CAS. AirLand Battle and the 31 Initiatives represented a period of Army-Air Force compromise and agreement in which the services laid the framework for current JCAS doctrine and procedures.<sup>213</sup> However, though issues with CAS partially abated, AirLand Battle brought the Army and USAF into conflict regarding deep operations.

AirLand Battle doctrine envisioned attack helicopters interdicting Soviet formations in “deep areas” beyond the range of artillery.<sup>214</sup> This closely resembled Interdiction, within the realm of the USAF. Commensurate with this doctrinal focus, the Army began new weapons programs, specifically the “Big 5:” the M1, M2, the Patriot Air Defense system, as well as the UH-60 and AH-64 helicopters. The AH-64 Apache, along with the Multiple Launch Rocket System, gave the Army deep capability. Army

deep operations conflicted with USAF Interdiction doctrine. AirLand Battle “asserted that the deep battle was just a portion of the land battle,” which meant the ground commander synchronized the deep battle, to include USAF efforts.<sup>215</sup> To support the new doctrine and the complexity of new aircraft as well as tailored training and personnel, the Army established an aviation branch in 1982.



Figure 9. The Army’s “Big 5” plus the MLRS

*Source:* US Army Center for Military History, “Gulf War Photographs,” accessed May 5, 2015, [http://www.history.army.mil/photos/gulf\\_war](http://www.history.army.mil/photos/gulf_war).

As the Army developed AirLand Battle, an Air Force officer reaffirmed the concept of air power as an independent means of defeating an enemy. COL John Warden, following in the footsteps of theorists like Douhet and Mitchell, sought to achieve strategic paralysis of an enemy by focused application against his “system.”<sup>216</sup> This would allow ground forces to act “in a role subordinate to the air by ‘flushing out’ the enemy. It was the ‘shield’ to airpower’s ‘sword.’”<sup>217</sup> Warden believed ground commanders should “think of CAS in terms analogous to the operational reserve,” and

employ it sparingly as a “scarce and valuable commodity.”<sup>218</sup> Warden’s Five Rings model provided a guide to employing air power that would create “strategic paralysis” of the adversary by pushing the right buttons.<sup>219</sup> Warden’s 1988 *The Air Campaign* was a Jominian approach to air power that nested well with USAF preferences.

### Desert Storm

As US Central Command (CENTCOM) began planning operations after the Iraqi invasion in August 1990, Warden was running “Checkmate,” a wargaming cell in the Pentagon focused on future threats.<sup>220</sup> As CENTCOM began planning for operations, Warden’s team flew to Saudi Arabia and briefed GEN Schwarzkopf, the CENTCOM Commander, and GEN Colin Powell, Chairman of the Joint Chiefs, with a “first cut” of a plan to attack Iraq.<sup>221</sup> The plan—called “Instant Thunder” to distinguish it from the slow-to-develop “Rolling Thunder” Vietnam campaign—attacked Iraqi C2, political, and infrastructure targets while nearly ignoring the Iraqi army.<sup>222</sup>

In contrast to Vietnam, the CENTCOM Joint Forces Air Component Commander (JFACC) controlled nearly all aircraft, except for Army helicopters, some support aircraft, and Marine Corps aviation. Because of reforms implemented by the 1986 Goldwater-Nichols Act, the JFACC, LTG Charles A. Horner, controlled nearly 3,000 coalition aircraft.<sup>223</sup> Horner adapted Warner’s plan to include a significant effort against the Iraqi Army in Kuwait, including more than 700 missions during the first week.<sup>224</sup> The air plan had five objectives: isolate and incapacitate the Iraqi regime; gain and maintain air superiority; destroy Iraq’s capacity for nuclear/chemical warfare; eliminate Iraq’s offensive capabilities; collapse of the Iraqi army.<sup>225</sup>

Given the focus on the USAF air campaign, Army helicopters ironically commenced the war. In the early hours of January 17, 1991, Army AH-64 Apaches following USAF Pave Low Helicopters, departed Saudi Arabia and crossed into Iraq. The helicopters flew at just 50' over the desert to their targets, two Iraqi radar sites. Destroying the radars opened a gap in Iraqi coverage all the way to Baghdad for hundreds of coalition aircraft.<sup>226</sup> As the air campaign went on, Schwarzkopf had Horner focus on the Iraqi Army in Kuwait. Schwarzkopf wanted to destroy or disable 50 percent of the 5,000 Iraqi tanks in Kuwait before the ground offensive.<sup>227</sup>

When coalition ground forces expelled the Iraqi Army from Kuwait in less than 100 hours, air power enthusiasts were quick to suggest that the air campaign had made the war a “cake walk” for ground commanders.<sup>228</sup> However, the air campaign did not destroy Iraqi forces or front-line morale, though some infantry units collapsed when faced with coalition land forces. The majority of Iraqi divisions in Kuwait maneuvered and engaged despite the aerial onslaught. Only then did significantly better-trained and equipped American and British forces rout them. Moreover, air power did not weaken Iraqi forces enough to significantly change the battlefield calculus. In most major engagements, American ground forces were either outnumbered or had simple parity.<sup>229</sup>

The breathtaking speed of ground war hid major issues of coordination between ground and air commanders regarding synchronization and targeting. Many issues resulted from Schwarzkopf's reluctance to appoint a land component commander (LCC) or a joint targeting board.<sup>230</sup> Without a LLC, the corps commanders felt the ACC ignored their target nominations and the Fire Support Coordination Line (FSCL).

1991 joint doctrine defined the FSCL as permissive control measure, “established by the appropriate ground commander to ensure coordination of fire not under the commander’s control but which may affect [operations].”<sup>231</sup> The FSCL functioned as a modern bomb line.<sup>232</sup> Historically, the bomb line began at artillery range, but systems deep systems now gave the Army significantly increased range. In Desert Storm, the JFACC, in violation of joint doctrine, viewed the FSCL as a restrictive divide between CAS and Interdiction.<sup>233</sup> On the contrary, Army artillery manuals stated, “[attacking] targets beyond the FSCL by Army assets should be coordinated with supporting tactical air . . . However, the inability to effect the coordination does not preclude the attack of targets beyond the FSCL.”<sup>234</sup> In other, words ground commanders should tell the air component about their attacks, but were not required to do so. As both Joint Forces Commander and LCC, Schwarzkopf owned the FSCL, but delegated this authority to the corps commanders once the ground war began.<sup>235</sup>

Because Horner viewed the FSCL as restrictive, the line served as a divide between ground and air operations as opposed facilitating efforts. JFACC controllers used the FSCL to separate CAS and Interdiction sorties. Since ground forces moved so quickly, Horner directed Interdiction missions 30NM in front of the FSCL, nicknamed the “Horner Line.”<sup>236</sup> Between this line and the FSCL (figure 10), Horner required FAC(A) control, a kind of bridge between Interdiction and CAS. These measures aided in de-conflicting artillery, CAS, MLRS, and Army helicopters, but there were not enough FACs to control CAS. This created issues as FSCLs moved forward.

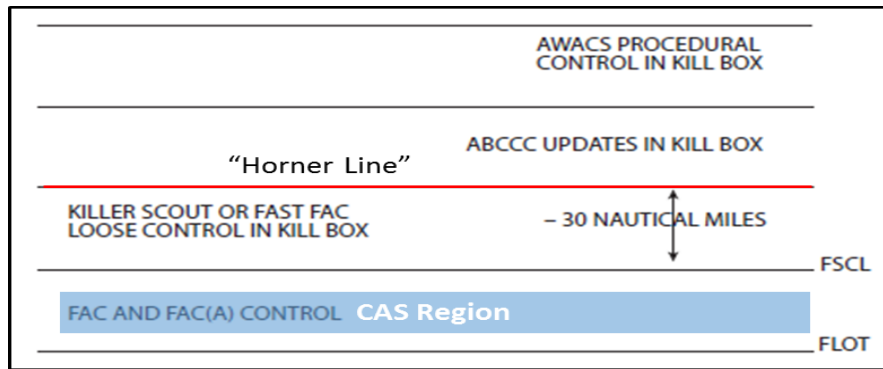


Figure 10. Relation Between the FSCL and “Horner Lines”

Source: Terrance McCaffrey, LTC, USAF, *What Happened to Battlefield Air Interdiction* (Maxwell AFB, AL: 2004). Author’s inclusion of color graphics.

During the ground offensive, each Army corps commander set an independent FSCL. This complicated air operations as the FSCL moved inconsistently forward with each separate corps (figure 11). Due to terminal control requirements, ground commanders could not mass CAS sorties; therefore, they preferred organic means to engage “deep” targets. On February 27, the VII Corps commander, LTG Fred Franks, moved the FSCL 80KM forward to accommodate rapid ground movement and desire to attack targets with artillery and long-range rockets. Later that day, XVIII Airborne Corps commander, LTG Gary Luck, likewise moved his FSCL forward nearly 100KM to allow his AH-64 Helicopters to attack retreating Iraqi forces.<sup>237</sup> Thinking they would get more CAS inside of the FSCL, the move instead had the opposite effect. Combined, Horner’s rules and the corps commanders’ actions segregated ground and air actions. While preventing fratricide, their combined actions also allowed the escape of Iraqi units, specifically the Republican Guard, in the gap between CAS and Interdiction.<sup>238</sup> Further frustrating the corps commanders was a perception that Horner was refusing

their requests when, in reality, Horner was simply following Schwarzkopf's directives.<sup>239</sup>

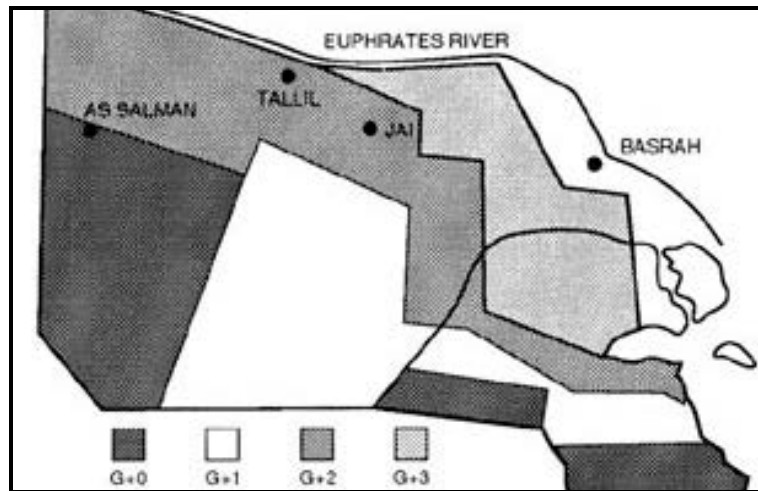


Figure 11. Daily FSCL Location (1800L) G+0: 24FEB1991

*Source:* Richard B. H. Lewis, "Desert Storm-JFACC Problems Associated with Battlefield Preparation" (Research paper, Army War College, 1993), 24.

Air power met Schwarzkopf's goal of 50 percent attrition for Iraqi forces only sporadically.<sup>240</sup> Some Iraqi units had losses upwards of 70 percent, while others were relatively unscathed. A serious issue came, ironically, from the static posture of the Iraqi Army. Pilots flying at 10,000 feet had difficulty discerning "a tank half-buried in the sand from a sheet of corrugated metal half-buried in the sand."<sup>241</sup> Furthermore, even precision thermal sights had difficulty discriminating between active tanks and those already abandoned, destroyed, or simply warmed by the sun. Consequently, many Iraqi vehicles received multiple hits. Overall, Iraqi tanks fared better than personnel carriers and artillery, remaining over 70 percent strength in Kuwait before the ground campaign



began.<sup>242</sup> The better Iraqi units, such as the Republican Guard, were still cohesive, effective units.<sup>243</sup> Strangely, post-war USAF histories excuse this based on the desert soil, which “reduced secondary bomb damage and direct hit accuracy.”<sup>244</sup> Left unsaid were questions about the nation’s reliance on air power that was only marginally effective against a static enemy in the open desert.

An air power myth developed during Desert Storm centered on the need for high-tech aircraft and precision ordnance which, according to air power advocates, eliminated the need for ground forces, or at least made their role negligible. One of the most effective platforms during the war was the A-10. The USAF had argued against deploying the A-10 because of Iraq’s air defense system.<sup>245</sup> In fact, while flying at night, the slower, older A-10 had the same survival rate as the vaunted F-117, even on A-10s missions into central Iraq.<sup>246</sup> In fact, the A-10’s survival rate was better than the F-15 and comparable to the F-16.<sup>247</sup> The A-10 flew over 8,000 sorties, more than any aircraft except the F-16, and had the highest effective rate of sorties per aircraft.<sup>248</sup> A-10s fired nearly 90 percent of the 5,500 tank-killing Maverick Missiles used during the war and were.<sup>249</sup> Despite comprising just 10 percent of coalition air assets, A-10s destroyed nearly 70 percent of Iraqi vehicles, an irony that should not be lost in light of later USAF claims that air power “eliminated the need for punishing force-on-force battle.”<sup>250</sup> A 1997 Government Accounting Office report concluded that the most effective air team consisted of large numbers of aircraft, varied in capabilities, as opposed to multi-role aircraft.<sup>251</sup> The report argued strongly for a quantitative edge in low-tech weapons and aircraft as opposed to fewer high-tech weapons and aircraft, which often failed meet promises.

The USAF deployed over 1,000 aircraft, including nearly 600 support aircraft to the Persian Gulf during Desert Shield.<sup>252</sup> In many respects, the Gulf War represented the ideal situation for the application of air power. An isolated enemy operated in open terrain, controlled by a dictator exercising essentially unitary control. Enemy tactical ground forces, while great in number, remained stagnant during two months of bombing. After the initial air actions, coalition air forces operated with relative impunity and overwhelming numbers against a static enemy who lacked any geopolitical support.

The Gulf War was less a vindication of air power than an exception, especially in light of the unique factors of the 1991 war. Only an isolated despot like Saddam Hussein would allow a massive, uncontested buildup and a follow-on bombing without response. Iraq demonstrated to all potential adversaries the folly of conventional engagement against overwhelming American power. Moreover, air power failed in its central mission of the Gulf War: making the ground offensive unnecessary. After all, Instant Thunder was an outgrowth of Warden's ideas, meaning the air campaign should have collapsed the regime and Iraqi Army from without.

Even with the relatively ideal conditions in Desert Storm, air power was unable to bring about a decisive collapse of the enemy system without the application of ground forces. The Iraqi Army retained the freedom to maneuver; and though air power degraded Iraqi morale, it did not disintegrate Iraqi units from the air. Nor did coalition air power cut Iraqi supply lines or degrade Iraqi forces to the point that they were unable to resist the ground offensive.<sup>253</sup> "Though battered by the Coalition for 41 days, the Iraqi [headquarters] had retained control of its forces in [Kuwait]," allowing the Iraqis to react to the ground invasion by repositioning forces.<sup>254</sup> Regardless of the attacks against Iraqi

lines of communication and C2 nodes, “in a matter of hours and with great speed and efficiency, [the Iraqis] had six heavy brigades from at least four divisions moving west.”<sup>255</sup> The air campaign failed each of its ambitious goals.

Post-war USAF histories such as the *Gulf War Air Power Survey* variously attempted to excuse the failure to destroy the Republican Guard and air power’s “decisiveness”. The service, and many in throughout the defense establishment, believed “a new era in strategic bombing had begun,” in which technology had finally enabled the Air Force to implement they theories of Douhet and Mitchell.<sup>256</sup> Riding high on the apparent laurels of Desert Storm, the USAF believed “any future aggressor state [will] hesitate to call such destruction down upon itself.”<sup>257</sup>

### Operations in Afghanistan and Iraq

Although the early war in Afghanistan seemed spectacular, significant fissures became apparent in the spring of 2002 during Operation Anaconda, an operation to capture Taliban leaders hiding in extremely rugged terrain in the Shah Kot Valley. With ground forces in Afghanistan, air units in Qatar, and the overall headquarters at CENTCOM in Florida, ground commanders did not incorporate air planning until two days before the start of Operation Anaconda.<sup>258</sup> Further muddling planning efforts, the ground component did not provide liaison officer to supporting USAF squadrons.<sup>259</sup>

Anaconda highlighted a pattern for future operations in the War on Terror: massive air support to the lowest level. With over 700 bomb strikes in the first three days, ground forces in Operation Anaconda had substantial assets at their disposal.<sup>260</sup> On just the first day, with slightly more than a brigade’s worth of soldiers in combat, AH-64 Apaches fired 540 rounds of 30mm and hundreds of rockets, suffering serious damage in

the process of getting close enough to separate friendly from enemy positions, while Air Force, Navy, and Marine aircraft dropped at least seventy-five bombs.<sup>261</sup> Over the course of the 13-day battle, joint aircraft dropped an average of 235 bombs daily.<sup>262</sup> Moreover, despite short notice, the Air Force “generated 900 attack missions which dropped more than 15,000 weapons on targets in an area smaller than [an airfield], and operated in airspace as restrictive as our nation’s capital.”<sup>263</sup>

However, the preponderance of US firepower also illuminated flaws with JCAS. Unlike Army helicopters, CAS terminal control was limited to qualified personnel. Many Air Force pilots lacked proficiency in CAS while the extreme distances limited aircraft time on station. In some cases, aircraft could only remain overhead for a short time before requiring refuel.<sup>264</sup> The ebb and flow of aircraft complicated airspace management. The distance complicated coordination and understanding, as aircrews received, at best, third-hand information passed through multiple headquarters, rather than direct coordination with ground units. The congested airspace meant requests took time, as controllers worked aircraft into queues. Even when targets did not require CAS procedures, the time to strike was “anywhere from twenty-six minutes to [occasionally hours] for the precision munitions to hit the targets.”<sup>265</sup> Hagenbeck, echoing the perspective of ground commanders since WWII, remarked, “A ground force commander does not care about number of sorties being flown or the number and types of weapons being dropped. All that matters is whether [the weapons] provide the right effects.”<sup>266</sup>

Doctrine developed along the Close-Deep-Rear framework failed to account for the complexity of a battlefield where enemies, friendlies, and civilians intermingled with challenging terrain, making identification difficult. Furthermore, the C2 structure was

complicated, with various commanders located at different sites such as Bagram, Afghanistan, Qatar, and Tampa, directing operations and assets with small (8x8 km) valley.<sup>267</sup> The official Air Force report on Anaconda summarized the conflicts:

In effect, the old doctrinal concepts of control lines and area ownership did not apply. Dozens [control measures] created a jigsaw puzzle of battlespace control measures. It was all very different from the phase lines, corps boundaries, and FSCL of a conventional battlefield. Adding to the confusion, each set of players had their own preferences.<sup>268</sup>

Trained to identify massed armor formations independent of friendly ground operations, Apache pilots found themselves engaging groups of individuals near friendly forces. Due to the vast distances and minimal forces in the country, as well as artificial limitations imposed such as limited deployment of artillery and AH-64s, Army units relied on the USAF for the preponderance of fire support. This was contrary to Air Force and Army doctrine, as well as logistically difficult. Army Historian John McGrath summarized the fire support situation:

However, in [Anaconda], the substitution of close air support for the traditional close support role of field artillery fell flat because of poorly coordinated airstrikes and an erroneous appreciation of the enemy situation. This latter operation showed the continued importance of close and effective coordination between ground and air forces.<sup>269</sup>

In contrast to Desert Storm, where only 6 percent of sorties were CAS, in Operation Iraqi Freedom, 75-79 percent required some type of integration with ground forces or terminal control.<sup>270</sup> The Army component of the invasion was V Corps, with a main force of three Army divisions. USAF LTC Michael McGee led the V Corps Air Support Operations Group (ASOG). McGee had served in tactical aviation his entire career, and spent considerable effort to improve the V Corps air support concepts. A simple question prompted McGee's efforts: "When you find the target, why not kill it

right now?”<sup>271</sup> Interdiction and CAS doctrine remained essentially unchanged since 1991, despite the issues with the FSCL. Air Force processes remained tied to Interdiction; there was “no mechanism [that] allowed the [ASOG] to find, clear and kill a target as soon as it was identified.”<sup>272</sup>

This time, however, the Iraqis would not repeated the mistakes made a decade earlier. Rather than linger in open positions as easy targets for American air power, the Iraq formations clustered in cities, making themselves difficult targets and planned extensive use of irregular forces. Additionally, the rapid start to the invasion and the lack of organic Army artillery meant that air support was critical to Army forces. To support the Corps, McGee improvised and dismissed the control principles espoused in USAF doctrine. His ASOG would travel with the V Corps headquarters and allocate USAF sorties in the gap between each Army division’s CAS and the FSCL. The results were impressive. McGee’s ASOG directed nearly 1,500 missions as well as 300 Army MLRS launches, reducing various Iraqi divisions by over 50 percent and supporting the JFACC Interdiction campaign by suppressing enemy air defenses.<sup>273</sup> The ASOG co-located with the Corps’ headquarters in order to utilize intelligence to adjust strikes, a requirement given the Iraqi dispositions within cities. This cooperation and understanding resulted in no air-surface fratricide within the V Corps.<sup>274</sup>

As operations in Iraq and Afghanistan entered steady-state conditions, USAF planners at CENTCOM found themselves left out of the main effort. The Air Force found itself at an impasse, providing nearly continuous CAS support in addition to its other worldwide requirements. However, it was not the same CAS as in Korea, Vietnam, or Desert Storm. Air Force CAS would operate much the same as Army Aviation, in

direct or general support roles for fixed blocks of time. However, unlike Army Aviation—which operated close to ground forces and generally from the same locations—USAF CAS arrived on the battlefield with little knowledge of on-going operations and only a basic understanding of the ground commander’s intent.

The fighting that developed in Iraq and Afghanistan was generally small-scale, consisting of platoon patrols and company-level clearing operations. During counter-insurgency operations, ground forces depended on air support to aid dispersed operations and provide precision fires. Airborne precision fire support became critical. With a lack of targets, the Air Force was relegated to a supporting role. Though personal efforts among the various staffs eliminated some friction, the reality of geography and service parochialism dictated much of the USAF’s involvement. Army commanders simply relied more on Army Aviation to meet their needs. Army CABS co-located with ground units, had the right communications equipment (FM Radios, Blue Force Tracker), and with the exception of the AC-130, substantially more loiter time.<sup>275</sup>

Many airmen felt that the AOC had been relegated to a help desk for airpower, with each individual request representing a trouble ticket from a supported commander. Without involvement in the early stages of planning, it was almost impossible to put each of these tactical requests into an operational context. . . . Instead of proactively applying airpower to the joint force commander’s priorities, the AOC had become almost entirely reactive to the requests of numerous supported commanders—and the trouble tickets kept pouring in.<sup>276</sup>

After the invasions, nearly all USAF tactical operations in Iraq and Afghanistan consisted of CAS. These long-duration missions taxed the USAF tactical aircraft fleet, so that by 2009, on average, aircraft were over 20 years old and had consumed more than half of their service life.<sup>277</sup> One would think this long-term integration would produce excellent JCAS. However, a 2008 Air College paper highlighted the continuing

issues inhibiting JCAS. The author contends the “Understanding of what CAS ‘is’ and ‘is not’ still varies.”<sup>278</sup> As demonstrated in Korea and Vietnam, the services have heavy issues pulling them apart, making CAS the most visible manifestation of deep differences in service priorities and viewpoints.

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<sup>1</sup> Kent Greenfield, LTC, USA, “Army Ground Forces and the Air-Ground Battle Team Including Organic Light Aviation” ( Army Ground Forces, Study No. 35, Ft. Monroe, VA, May 1948), 49, accessed April 30, 2015, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA954913>.

<sup>2</sup> Headquarters, War Department, FM 100-20 *Command and Employment of Airpower* (Washington, DC: GPO, July 1943), 1.

<sup>3</sup> Ibid., 6-7.

<sup>4</sup> Ibid., 11.

<sup>5</sup> Headquarters, 9th Air Force, “Ninth Air Force Organizational Chart,” June 6th, 1944, Box 53: Ninth Air Force, Hoyt Vandenberg Papers, Manuscript Division, Library of Congress, Washington, DC.

<sup>6</sup> Stephen E. Ambrose, *Eisenhower : Soldier and President* (New York: Simon and Schuster, 1990), 126.

<sup>7</sup> Thomas Alexander Hughes, *Over Lord : General Pete Quesada and the Triumph of Tactical Air Power in World War II* (New York: Free Press, 1995), 121.

<sup>8</sup> Kenn Rust, *The 9th Air Force in World War II* (Fallbrook, CA: Aero Publishers, 1967), 69.

<sup>9</sup> Martin Van Creveld, *The Age of Airpower* (New York: PublicAffairs, 2011), 143.

<sup>10</sup> Department of the Air Force, Historical Division, “The Employment of Strategic Bombers in a Tactical Role 1941-1951” (Study, Air University, Maxwell AFB, AL, 1953), 154, accessed May 7, 2015, <http://www.afhra.af.mil/studies/numberedusafhistoricalstudies51-100.asp>; “Interrogation of Generalfeldmarschall von Rundstedt by a British Army Officer,” September 2, 1945, Carl Spaatz Papers, Box 134: Interrogations, Manuscript Division, Library of Congress, Washington, DC, 5.

<sup>11</sup> Phillip S. Meilinger, *Hoyt S. Vandenberg, the Life of a General* (Bloomington, IN: Indiana University Press, 1989), 51.



<sup>12</sup> David N. Spires, *Air Power for Patton's Army: XIX Tactical Air Command in the Second World War* (Washington, DC: Air Force History and Museums Program, 2002), 147-49.

<sup>13</sup> Bradford J. Shwedo, *XIX Tactical Air Command and Ultra* (Maxwell, AFB: AL, Air University Press, 2001), 4.

<sup>14</sup> *Ibid.*, 8.

<sup>15</sup> Dennis E. Showalter, *Patton and Rommel : Men of War in the Twentieth Century* (New York: Berkley Caliber, 2005), 371; Spires, *Air Power for Patton's Army*, 148, 154.

<sup>16</sup> Michael J. Chandler, LTC, USAF, "Gen Otto P. Weyland, USAF-Close Air Support in the Korean War" (Master's thesis, School of Advanced Air and Space Studies, 2007), 19.

<sup>17</sup> Alan Axelrod, *Patton: A Biography* (New York: Macmillan, 2006), 77-79.

<sup>18</sup> Chandler, 17-18.

<sup>19</sup> Eugene M. Greenberg, "Signals, the Story of Communications in the XIX Tactical Air Command up to V-E Day," XIX TAC Headquarters, Germany, June 1945, Library of Congress, Washington, DC, 62.

<sup>20</sup> Spires, *Air Power for Patton's Army*, 160.

<sup>21</sup> David Syrett, "The Tunisian Campaign, 1942-43," W. A. Jacobs, "The Battle for France, 1944," in *Case Studies in the Development of Close Air Support*, ed. Benjamin Frankling Cooling (Washington, DC: Office of Air Force History, 1990), 157.

<sup>22</sup> Greenberg, 61.

<sup>23</sup> Showalter, 371.

<sup>24</sup> Spires, *Air Power for Patton's Army*, 152.

<sup>25</sup> XIX TAC, "Twelve Thousand Fighter-Bomber Sorties: XIX Tactical Air Command's First Month Operations in Support of Third Us Army in France," France, September, 1944, 59, accessed March 1, 2015, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll8/id/356>.

<sup>26</sup> Peter R. Mansoor, *The GI Offensive in Europe: The Triumph of American Infantry Divisions, 1941-1945* (Lawrence, KS: University Press of Kansas, 1999), 163.

<sup>27</sup> *Ibid.*, 164.

- <sup>28</sup> Rust, 67-68.
- <sup>29</sup> Greenfield, 74.
- <sup>30</sup> Shwedo, 9.
- <sup>31</sup> W. A. Jacobs, "The Battle for France, 1944," in *Case Studies in the Development of Close Air Support*, ed. Benjamin Frankling Cooling (Washington, DC: Office of Air Force History, 1990), 247.
- <sup>32</sup> Showalter, 371.
- <sup>33</sup> Shwedo, 28.
- <sup>34</sup> Jacobs, 278.
- <sup>35</sup> Ibid.
- <sup>36</sup> Spires, *Air Power for Patton's Army*, 154.
- <sup>37</sup> XIX TAC, "Twelve Thousand Fighter-Bomber Sorties," 3.
- <sup>38</sup> Jacobs, 260.
- <sup>39</sup> Meilinger, 51-52.
- <sup>40</sup> Jacobs, 280.
- <sup>41</sup> XIX TAC, "Twelve Thousand Fighter-Bomber Sorties," 4.
- <sup>42</sup> Showalter, 371.
- <sup>43</sup> Jacobs, 279-280.
- <sup>44</sup> XIX TAC, "Twelve Thousand Fighter-Bomber Sorties," 4.
- <sup>45</sup> 9th Air Force, 26th Statistical Control Group, "Statistical Summary of Ninth Air Force Operations: 16 October 1943--8 May 1945," Vandenberg Papers; Box 53: Ninth Air Force, Manuscript Division, Library of Congress, Washington, DC, 15.
- <sup>46</sup> Shwedo, 10.
- <sup>47</sup> Ibid., 65.
- <sup>48</sup> XIX TAC, "Twelve Thousand Fighter-Bomber Sorties," 24.

<sup>49</sup> Heinz Günther Guderian and Fritz Kramer, *Fighting in Normandy: The German Army from D-Day to Villers-Bocage* (Mechanicsburg, PA: Greenhill Books, 2001), 202.

<sup>50</sup> “Interrogation of Generalfeldmarschall von Rundstedt,” September 2, 1945, Carl Spaatz Papers.

<sup>51</sup> Van Creveld, 153.

<sup>52</sup> Shwedo, 7.

<sup>53</sup> “Interrogation of Reichsmarschall Hermann Goering by GEN Spaatz, LTG Patch, LTG Vandenberg, BG Curtis, BG Barcus, MAJ Alexander de Seversky, and Dr. Hopper,” May 10, 1945, Carl Spaatz Papers, Box 134: Interrogations, Manuscript Division, Library of Congress, Washington, DC.

<sup>54</sup> Max Hastings, *Overlord: D-Day and the Battle for Normandy* (New York: Simon/Schuster, 1984), 183.

<sup>55</sup> Guderian and Kramer, 205.

<sup>56</sup> Spires, *Air Power for Patton’s Army*, 59, 111.

<sup>57</sup> David Spires, “Patton and Weyland: A Model for Air-Ground Cooperation,” in *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940-43*, ed. Daniel Mortensen (Maxwell AFB, AL: Air University, 1998), 150.

<sup>58</sup> Headquarters, War Department, FM 100-20, 12.

<sup>59</sup> Shwedo, 10.

<sup>60</sup> Spires, *Air Power for Patton’s Army*, 160.

<sup>61</sup> Shwedo, 83.

<sup>62</sup> Rust, 98-99.

<sup>63</sup> Meilinger, 52.

<sup>64</sup> Showalter, 372.

<sup>65</sup> Rust, 96-101.

<sup>66</sup> Jacobs, 274-277.

<sup>67</sup> Meilinger, 1989.

<sup>68</sup> Rust, 74.

<sup>69</sup> Headquarters, 9th Air Force, *Reconnaissance in the 9th Air Force*, May, 1945 Beddell Smith Collection of World War II Documents, 1941-1945, Series VI: Air Force Operational Unit, Box 48, Dwight D. Eisenhower Presidential Library.

<sup>70</sup> Ibid.

<sup>71</sup> Spires, *Air Power for Patton's Army*, 141-42.

<sup>72</sup> Headquarters, XIX TAC, *Statistical Summary of XIX Tactical Air Command*; Publications Files, compiled 1940-1945, NM8479, Record Group 165: Records of the War Department General and Special Staffs, 1860-1952; National Archives, College Park, MD, 6; Headquarters, 3rd Army, "Third US Army Operations September-December 1944," 338.9.3, Box No. 484; Records of the Armies 1925-66, Record Group 338; National Archives, College Park, MD, 5.

<sup>73</sup> George Patton, GEN, USA, "Letter of Instruction No. 4," 25 September 1944, Nancy, France, Patton Papers; Box 12: Chronological File May-December 1944, Manuscript Division, Library of Congress, Washington, DC.

<sup>74</sup> Ibid.

<sup>75</sup> 3rd US Army, "After Action Report Third US Army 1 August 1944–9 May 1945," Washington, DC, Library of Congress, 2 October.

<sup>76</sup> HQ, AAF, *Condensed Analysis of the 9th Air Force in the European Theater of Operations* (1946; repr., Washington, DC: Office of Air Force History 1984), 18.

<sup>77</sup> 3rd US Army, "After Action Report Third US Army," 18 December.

<sup>78</sup> Patton, "Notes on Bastogne Operation," Patton Papers, Box 49: 1944-1945, Manuscript Division, Library of Congress, Washington, DC, January 16, 1945, 2-3.

<sup>79</sup> 3rd US Army, "After Action Report Third US Army," 18 December.

<sup>80</sup> Ibid., 21 December.

<sup>81</sup> XIX TAC, *Statistical Summary of XIX Tactical Air Command*; 3rd US Army, "After Action Report Third US Army," 22-23 December.

<sup>82</sup> Spires, *Air Power for Patton's Army*, 199.

<sup>83</sup> 3rd US Army, "After Action Report Third US Army," 24-27 December.

<sup>84</sup> Meilinger, 57.

<sup>85</sup> Headquarters, Army Air Forces (HQ AAF), Office of Statistical Control, *Army Air Forces Statistical Digest*, 2nd ed. (Washington, DC, December 1945), 7, 14,

- <sup>86</sup> Ibid., 143.
- <sup>87</sup> Spires, *Air Power for Patton's Army*, 18.
- <sup>88</sup> HQ AAF, *Army Air Forces Statistical Digest*, 12.
- <sup>89</sup> Richard Irving Wolf, *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, 1987), 91-167.
- <sup>90</sup> Alfred Goldberg and LTC Donald Smith, USAF, *Army-Air Force Relations: The Close Air Support Issue* (Santa Monica, CA: RAND, October 1971), 5-7.
- <sup>91</sup> Holley, 542.
- <sup>92</sup> Arthur Millet, "Korea 1950-1953," in *Case Studies in the Development of Close Air Support*, ed. Benjamin Frankling Cooling (Washington, DC: Office of Air Force History, 1990), 349.
- <sup>93</sup> William W. Momyer, *Air Power in Three Wars, Flight, Its First Seventy-Five Years* (New York: Arno Press, 1980), 58-61.
- <sup>94</sup> Spires, *Air Power for Patton's Army*, 46.
- <sup>95</sup> Robert Frank Futrell, *The United States Air Force in Korea, 1950-1953* (New York: Duell, 1961), 58.
- <sup>96</sup> Ibid.
- <sup>97</sup> Momyer, 62.
- <sup>98</sup> Michael Lewis, MAJ, USAF, "Lt Gen Ned Almond, USA: A Ground Commander's Conflicting View with Airmen over CAS Doctrine and Employment" (Master's thesis, School of Advanced Air and Space Studies, 1997), 59.
- <sup>99</sup> Ibid., 53.
- <sup>100</sup> MAJ Michael Dolan, USA, "Tactical Air Support of Combat Divisions in Korea, 1951; Joint Tactical Air ,Support Board Decimal File 1949-1951, Army Field Forces HQS, General Staff,G-3 Section; 373.21, Box No. 484; HQ Army Ground Forces, Record Group 337; National Archives, College, Park, MD, 11.
- <sup>101</sup> General Almond to Chief, Army Field Forces, letter, subject: Effectiveness of Close Air Support, 1952, Joint Tactical Air ,Support Board Decimal File 1949-1951, Army Field Forces HQS, General Staff,G-3 Section; 373.21, Box No. 484; HQ Army Ground Forces, Record Group 337; National Archives Building, College Park, MD, 19.
- <sup>102</sup> Holley, 549.

- <sup>103</sup> Chandler, 32.
- <sup>104</sup> Dolan, 117.
- <sup>105</sup> Ibid., 7-8; X Corps, "Army Tactical Air Support Requirements and Trends in Air-Ground Methods," Korea, December, 1950, 7, accessed April 28, 2015, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll11/id/1571>
- <sup>106</sup> David S. Chadsey, MAJ, USAF, "Rebuilding the Joint Airborne Forward Air Controller: Analyzing Joint Air Tasking Doctrine's Ability to Facilitate Effective Air-Ground Integration" (Master's thesis, Army Command and General Staff College, 2013), 32.
- <sup>107</sup> Millet, "Korea 1950-1953," 364.
- <sup>108</sup> J. Farmer and M. J. Strumwasser, *The Evolution of the Airborne Forward Air Controller: An Analysis of Mosquito Operation in Korea* (Santa Monica, CA: RAND, 1967), 26.
- <sup>109</sup> Ibid.
- <sup>110</sup> Dolan, 19.
- <sup>111</sup> Futrell, *The United States Air Force in Korea*, 362-363; X Corps, 7.
- <sup>112</sup> John J. McGrath, *Fire for Effect: Field Artillery and Close Air Support in the US Army* (Ft. Leavenworth, KS: Combat Studies Institute Press, 2010), 99.
- <sup>113</sup> Millet, "Korea 1950-1953," 363.
- <sup>114</sup> Farmer and Strumwasser, 10.
- <sup>115</sup> Ibid., 24.
- <sup>116</sup> Chandler, 42-43.
- <sup>117</sup> Lewis, 92.
- <sup>118</sup> Millet, "Korea 1950-1953," 351.
- <sup>119</sup> Lewis, 58-65.
- <sup>120</sup> Ibid., 373.
- <sup>121</sup> General Almond interview by CPT Thomas G. Fergusson, Senior Officers Debriefing Program, Almond Papers, Tape 1 (Carlisle Barracks, PA, US Army Military History Institute, 25-30 March 1975): Quoted in Lewis, 92.

- <sup>122</sup> Chandler, 57.
- <sup>123</sup> Ibid., 66.
- <sup>124</sup> X Corps, "Army Tactical Air Support Requirements and Trends," 3.
- <sup>125</sup> Ibid., 2.
- <sup>126</sup> Lewis, 17, 100.
- <sup>127</sup> Dolan, 11-13.
- <sup>128</sup> X Corps, "Army Tactical Air Support Requirements and Trends," 5.
- <sup>129</sup> Dolan, 16.
- <sup>130</sup> Millet, "Korea 1950-1953," 374.
- <sup>131</sup> Van Creveld, 113.
- <sup>132</sup> Chandler, 57.
- <sup>133</sup> Chadsey, 103.
- <sup>134</sup> Ibid., 35.
- <sup>135</sup> Stephen J. McNamara, MAJ, USAF, *Airpower's Gordian Knot: Centralized Vs. Organic Control* (Research Paper, Maxwell AFB: Air University Press, 1994), 33.
- <sup>136</sup> Millet, "Korea 1950-1953," 395-399.
- <sup>137</sup> Dolan, "Tactical Air Support of Combat Divisions in Korea," 1, 2, 25.
- <sup>138</sup> Joint Chiefs of Staff, "Joint Tactical Air Support Board Charter," October 24 1951, Joint Tactical Air Support Board, Decimal File 1949-1951, Army Field Forces HQS, General Staff, G-3 Section; 320.3 to 334, Box No. 478; HQ Army Ground Forces, Record Group 337; National Archives, College Park, MD.
- <sup>139</sup> Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the US Air Force* (Maxwell AFB: Air University Press, 1989), 401.
- <sup>140</sup> Farmer and Strumwasser, 83.
- <sup>141</sup> Millet, "Korea 1950-1953," 397.
- <sup>142</sup> Dolan, 25.

- <sup>143</sup> Scott A. Hasken, MAJ, USA, “A Historical Look at Close Air Support” (Master’s thesis, Army Command and General Staff College, 2003), 31.
- <sup>144</sup> Goldberg and Smith, 9.
- <sup>145</sup> Van Creveld, 425.
- <sup>146</sup> Robert Futrell, *Basic Thinking in the US Air Force*, 219-303.
- <sup>147</sup> Frederic A. Bergerson, *The Army Gets an Air Force : Tactics of Insurgent Bureaucratic Politics* (Baltimore: Johns Hopkins University Press, 1980), 69-72.
- <sup>148</sup> Wolf, 296-297.
- <sup>149</sup> Goldberg and Smith, 12; Wolf, 241-46.
- <sup>150</sup> James M. Gavin, LTG, USA, “Cavalry, and I Don't Mean Horses,” *Harper's Magazine* (April 1954): 55, accessed May 5, 2015, <http://harpers.org/archive/1954>.
- <sup>151</sup> Bergerson, 69-72.
- <sup>152</sup> Ian Horwood, *Interservice Rivalry and Airpower in the Vietnam War* (Ft. Leavenworth, KS: Combat Studies Institute Press, 2006), 101-02.
- <sup>153</sup> *Ibid.*, 101.
- <sup>154</sup> John J. Tolson, *Airmobility in Vietnam* (New York: Arno Press, 1981), 17-18.
- <sup>155</sup> *Ibid.*, 19.
- <sup>156</sup> Department of the Army, Tactical Mobility Requirements (Howze) Board. “Final Report.” (Ft. Bragg, NC, August 1962), accessed May 1, 2015, <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll11/id/1689>
- <sup>157</sup> Howze Board, “Final Report,” 95.
- <sup>158</sup> Horwood, 50.
- <sup>159</sup> Goldberg and Smith, *The Close Air Support Issue*, 26.
- <sup>160</sup> John J. Sbrega, “Southeast Asia,” in *Case Studies in the Development of Close Air Support*, ed. Benjamin Frankling Cooling (Washington, DC: Office of Air Force History, 1990), 415-417.
- <sup>161</sup> *Ibid.*, 418.
- <sup>162</sup> *Ibid.*



<sup>163</sup> Goldberg and Smith, 24.

<sup>164</sup> Ibid.

<sup>165</sup> Sbrega, 415.

<sup>166</sup> Holley, 543.

<sup>167</sup> Kristopher Gillet, MAJ, USA, “Air Mobility and the Development of Attack Aviation During the Vietnam War from 1965-1967” (Master’s thesis, Army Command and General Staff College, 2014), 7.

<sup>168</sup> Ibid., 12-13.

<sup>169</sup> Ibid., 24.

<sup>170</sup> Goldberg and Smith, 8-29.

<sup>171</sup> Sbrega, 419-421.

<sup>172</sup> Gillet, 38-39.

<sup>173</sup> Michael N. Riley, MAJ, USA, “The A-10 Thunderbolt as an Organic Army Asset” (Master’s thesis, Army Command and General Staff College, 1991), 8.

<sup>174</sup> Sbrega, 457.

<sup>175</sup> Ibid., 428.

<sup>176</sup> Hasken, 37.

<sup>177</sup> Ibid.

<sup>178</sup> Gillet, 39-40.

<sup>179</sup> Holley, 546.

<sup>180</sup> Ibid.

<sup>181</sup> Headquarters, Pacific Air Forces, Tactical Evaluation Center, “The Fall of a Chau,” by Kenneth Sams (Hickam AFB, HI, April 1966), 2, accessed May 5, 2015, <http://www.nationalmuseum.af.mil/shared/media/document/AFD-060629-001.pdf>.

<sup>182</sup> Ibid., 2-3.

<sup>183</sup> Ibid., 3.

<sup>184</sup> Ibid., 4.

<sup>185</sup> Sbrega, 451.

<sup>186</sup> Joint Chiefs of Staff, *The Use of Propeller and Jet Aircraft in Laos* (Washington, DC: GPO, 1968), accessed April 20, 2015, [http://www.dod.mil/pubs/foi/International\\_security\\_affairs/vietnam\\_and\\_southeast\\_asiaDocuments/700.pdf](http://www.dod.mil/pubs/foi/International_security_affairs/vietnam_and_southeast_asiaDocuments/700.pdf).

<sup>187</sup> Tittel, 50-52.

<sup>188</sup> Joint Chiefs of Staff, *The Use of Propeller and Jet Aircraft in Laos*, Appendix A.

<sup>189</sup> Sbrega, 431.

<sup>190</sup> Horwood, 126-27.

<sup>191</sup> Sbrega, 458.

<sup>192</sup> Ibid.

<sup>193</sup> Ibid.

<sup>194</sup> Ibid., 460.

<sup>195</sup> Commander, US Naval Forces Vietnam, "Operation of Marine Forces, Vietnam- Monthly Historical Summary." March 1968, accessed April 26, 2015, <http://www.dtic.mil/dtic/tr/fulltext/u2/a953615.pdf>.

<sup>196</sup> Sbrega, 452-65.

<sup>197</sup> Ibid., 423.

<sup>198</sup> Ibid., 455.

<sup>199</sup> Richard G. Davis, *The 31 Initiatives: A Study in Air Force-Army Cooperation* (Washington, DC: Office of Air Force History, 1987), 20.

<sup>200</sup> Goldberg and Smith, 32.

<sup>201</sup> Ibid., 83.

<sup>202</sup> Davis, 20-21.

<sup>203</sup> Horwood, 129.

<sup>204</sup> Goldberg and Smith, 33.

- <sup>205</sup> The production aircraft nomenclature is used here. Horwood, 134-189.
- <sup>206</sup> Davis, 22.
- <sup>207</sup> Arden B. Dahl, “The Warthog: The Best Deal the Air Force Never Wanted” (Monograph, National Defense University, 2003), 13.
- <sup>208</sup> Todd M. Larsen, MAJ, USAF, “John Boyd and the Airland Battle Doctrine” (Monograph, School of Advanced Military Studies, 2012), 18-25.
- <sup>209</sup> Farley, 116.
- <sup>210</sup> Robert H. Scales, *Certain Victory: The U.S. Army in the Gulf War* (Ft. Leavenworth, KS: Army Command and General Staff College Press, 1994), 25-26.
- <sup>211</sup> Huba Was de Czege, BG (ret.), USA, “CAS: A Modified Paradigm,” *Field Artillery* (March-April 2003): 3.
- <sup>212</sup> Headquarters, Department of the Army, FM 100-5 *Operations* (Washington, DC: GPO, 1982), 8-1.
- <sup>213</sup> Dahl, 1.
- <sup>214</sup> Headquarters, Department of the Army, FM 100-5 *Operations*, 1-1.
- <sup>215</sup> Kent R. Laughbaum, LTC, USAF, “Synchronizing Airpower and Firepower in the Deep Battle” (Research paper, Air University, 1999), 3.
- <sup>216</sup> Anthony B. Carr, “America’s Conditional Advantage: Airpower, Counterinsurgency, and The Theory of John Warden” (Research paper, Air University, June 2009), 8-10.
- <sup>217</sup> Weber, 83.
- <sup>218</sup> John Warden, *The Air Campaign* (San Jose, CA: toExcel), 171.
- <sup>219</sup> Carr, 10-13; John A. Warden III, COL, USAF, “The Enemy as a System,” *Air and Space Power Journal* 14, no. 1 (Spring 1995): 1-14, accessed May 20, 2015, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj95/spr95.htm>; Farley, 182.
- <sup>220</sup> Williamson Murray, *Air War in the Persian Gulf* (Baltimore: Nautical and Aviation, 1995), 16-17.
- <sup>221</sup> Thomas A. Keaney and Elliot A. Cohen. *Gulf War Air Power Survey Summary Report* (Washington, DC: GPO, 1993), 35-38.
- <sup>222</sup> Murray, *Air War in the Persian Gulf*, 17.

- <sup>223</sup> Laughbaum, 26.
- <sup>224</sup> Keaney and Cohen, 38; Laughbaum, 28.
- <sup>225</sup> William P. Head and Earl H. Tilford, *The Eagle in the Desert: Looking Back on U.S. Involvement in the Persian Gulf War* (Westport, CT: Praeger, 1996), 114-15.
- <sup>226</sup> Laughbaum, 28-29.
- <sup>227</sup> Keaney and Cohen, 115
- <sup>228</sup> Daryl G. Press, "The Myth of Air Power in the Persian Gulf War and the Future of Warfare," *International Security* 26, no. 2 (2001): 7, accessed February 25, 2015, <http://dx.doi.org/10.2307/3092121>.
- <sup>229</sup> Ibid., 22-25.
- <sup>230</sup> Laughbaum, 33-34; Scales, 140-41.
- <sup>231</sup> Joint Chiefs of Staff, Joint Publication (JP) 1-02 *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: GPO, 1989), 146.
- <sup>232</sup> The "bomb line" was a term used in WWII that means essentially the same as the modern Forward Line of Own Troops (FLOT). This line marked friendly troops, beyond which bombers could attack as they lacked the means to closely coordinate.
- <sup>233</sup> Laughbaum, 36-37.
- <sup>234</sup> Headquarters, Department of the Army, Field Manual (FM) 6-20-30 *Fire Support for Corps and Division Operations* (Washington, DC: 1989), F-3; Laughbaum, 30-31.
- <sup>235</sup> Laughbaum, 37-38.
- <sup>236</sup> Ibid., 37.
- <sup>237</sup> Keaney and Cohen, 157.
- <sup>238</sup> Ibid., 156-157.
- <sup>239</sup> Ibid., 155.
- <sup>240</sup> Murray, *Air War in the Persian Gulf*, 229.
- <sup>241</sup> Press, 41.
- <sup>242</sup> James A. Winnefeld, Preston Niblack, and Dana J. Johnson, *A League of Airmen: U.S. Air Power in the Gulf War* (Santa Monica, CA: RAND, 1994), 309.

- <sup>243</sup> Farley, 118-19.
- <sup>244</sup> Richard G. Davis, *Decisive Force-Strategic Bombing in the Gulf War* (Washington, DC: Air Force History and Museums Program, 1996), 70.
- <sup>245</sup> Dahl, 172-73.
- <sup>246</sup> General Accounting Office (GAO), National Security and International Affairs Division, *Operation Desert Storm-Evaluation of the Air Campaign*, GAO/NSIAD-97-134 (Washington, DC: GPO, June 1997), 27.
- <sup>247</sup> Winnefeld et al., 251-252.
- <sup>248</sup> The A-10 flew 8,100 sorties with 144 aircraft, a rate of 55 per aircraft. The F-16 rate was slightly lower, while the remainder of the USAF fleet was much lower, see Kenney and Cohen; Head and Tilford, 100.
- <sup>249</sup> Winnefeld et al., 251.
- <sup>250</sup> Scott A Fedorchak, CAPT, USAF. "Close Air Support: Repeating the Past . . . Again?" *Airpower Journal* 8, no. 1 (Spring 1994), accessed May 9, 2014, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj94/spr94>; Davis, 72.
- <sup>251</sup> GAO, *Operation Desert Storm-Evaluation of the Air Campaign*, 38, 83.
- <sup>252</sup> *Ibid.*, 83.
- <sup>253</sup> Press, 26-41.
- <sup>254</sup> Scales, 232-233.
- <sup>255</sup> *Ibid.*, 233.
- <sup>256</sup> Davis, preface.
- <sup>257</sup> *Ibid.*
- <sup>258</sup> Richard B. Andres and Jeffrey B. Hukill, "Anaconda: A Flawed Joint Planning Process," *Joint Forces Quarterly*, no. 47 (4th Quarter 2007): 137.
- <sup>259</sup> Chadsey, 63.
- <sup>260</sup> Department of the Air Force, Office of Air Force Lessons Learned, *Operation Anaconda-an Air Power Perspective* (Washington, DC: GPO, 2005), 7, accessed May 5, 2015, [http://www.au.af.mil/au/awc/awcgate/af/anaconda\\_unclassified.pdf](http://www.au.af.mil/au/awc/awcgate/af/anaconda_unclassified.pdf).

<sup>261</sup> Department of the Air Force, *Operation Anaconda-an Air Power Perspective*; Williams, *A History of Army Aviation-From Its Beginnings to the War on Terror* (Lincoln, NE: iUniverse, 2005), 383.

<sup>262</sup> Steven G. Olive, LTC, USAF, “Abdicating Close Air Support: How Interservice Rivalry Affects Roles and Missions” (Research paper, Army War College, 2007), 13.

<sup>263</sup> Chandler, 2.

<sup>264</sup> Sean Naylor, *Not a Good Day to Die: The Untold Story of Operation Anaconda* (New York: Berkley Books, 2005), 251.

<sup>265</sup> Franklin L Hagenbeck, MG, USA, “Afghanistan: Fire Support for Operation Anaconda,” *Field Artillery* (September-October 2002): 8.

<sup>266</sup> Ibid.

<sup>267</sup> Naylor, 152, 318.

<sup>268</sup> Department of the Air Force, *Operation Anaconda-an Air Power Perspective*, 46-47.

<sup>269</sup> McGrath, 155.

<sup>270</sup> Michael H. Johnson, MAJ, USMC, “Cleared to Engage-Improving Joint Close Air Support Effectiveness” (Monograph, Air Command and Staff College, June 2008); Charles E. Kirkpatrick, *Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom* (Association of the United States Army, 2004), 5. Gregory Fontenot COL (ret.), USA, LTC E. Degen, USA and LTC David Tohn, USA, *On Point: The United States Army in Operation Iraqi Freedom* (Ft. Leavenworth, KS: Combat Studies Institute Press, 2004), 249-50.

<sup>271</sup> Kirkpatrick, 2.

<sup>272</sup> Ibid.

<sup>273</sup> Ibid., 3-16.

<sup>274</sup> Ibid., 17.

<sup>275</sup> McGrath, 151.

<sup>276</sup> Clint Hinote, LTC, USAF, “Centralized Control and Decentralized Execution” (Monograph, Air University, March 2009), 24; Winnefeld et al., 4.

<sup>277</sup> Arthur and Eveker, *Alternatives for Modernizing U.S. Fighter Forces*, 9.

<sup>278</sup> Johnson, 7.

## CHAPTER 3

### LITERATURE REVIEW

Already holding a stout hand with Infantry, Armor, and Artillery, the ground troops have found that Tactical Air gives them much needed strength.

— MAJ Michael Dolan, Korea, 1951

Sources broadly fall into five groups: primary sources, historical studies, service doctrine, aircraft capabilities and cost data, and theses and military journal articles.

#### Primary Sources

WWII primary sources include the Carl A. Spaatz, George Patton, and Hoyt Vandenberg Papers, both located at the Library of Congress. Letters between Spaatz, Patton, and Vandenberg reveal a more cordial relationship between AGF and AAF officers than is typically depicted. Each seemed to respect the other for his services' capabilities and seemed determined to provide the best combination of means to defeat the Germans. It is a telling difference from the Army-Air Force animosity demonstrated in Korea and reflects the development of AAF doctrine in WWII. Additionally, the Eisenhower Presidential Archives contained a summary of 9th Air Force reconnaissance.

After WWII, the AAF expended significant effort to capture the effectiveness of its operations and their effects. The most well-known is the US Strategic Bombing Survey, which analyzed bombing's effects on German and Japanese industry. Statisticians also captured efforts regarding tactical actions, including , "The Employment of Strategic Bombers in a Tactical Role" and "Tactical Operations of the Eighth Air Force 6JUN44-8MAY45. XIX TAC also published data regarding operations in the "XIX TAC Statistical Summary," located at the National Archives in Maryland.



For the Korean War, primary sources were the Army records from the 1949 and 1950-52 JTASB. These consisted of letters and testimonials regarding CAS in Korea from officers such as LTG Almond, GEN Vandenberg, and GEN Mark Clark. Almond, the X Corps commander, argued vociferously for control of CAS assets given what he saw as the Air Force's limited CAS ability, particularly during the stalemate of 1952-53. His December 1950, X Corps Tactical Air Support Report excoriates USAF CAS. A particularly JTASB report was from MAJ Dolan. Dolan's report concerned his division's experience and was for the JTASB. As such, and given his rank, Dolan provides a balanced perspective without the vitriol of Almond. He even remarks, "Already holding a stout hand with Infantry, Army, and Artillery, the ground troops have found that [CAS] gives them much needed strength." Dolan calls for increased air-ground training and a CAS-specific aircraft, though this does not necessarily need to be non-jet.<sup>1</sup>

Lastly, the Howze Board report summarizes the efforts employed by the Army to fully explore the capabilities of the helicopter and incorporate them into its formation. The Howze Board tests took 11-weeks and involved nearly 150 aircraft flying over 11,000 hours.<sup>2</sup> The Board's report captures the Army's desire for mobility by internal means. The report does not challenge USAF CAS, but does acknowledge the role for Army helicopters to provide "limited interdiction and very close air support missions."<sup>3</sup>

### Historical Studies

A principal source CAS history is *Case Studies in the Development of Close Air Support*, a compendium of essays published by the Office of Air Force History regarding CAS. This text provides examples of CAS support in France during WWII, Korea, and Vietnam, as well as a retrospective essay by I. B. Holley, which summarizes the issue

during the formative days of Army-Air Force CAS relationship. *Case Studies* traces the development of doctrine and procedures related to CAS. Overall, authors conclude that ground and air commanders see the application and allocation of air power differently, using nearly irresolvable perspectives. While there are examples of great cooperation, the default condition is one of stove-piped application of air power, with air commanders focused on Interdiction and ground commanders on CAS.

David Spires *Patton's Air Force* chronicles the 3rd Army-XIX air-ground cooperation in France and Germany from the Normandy breakout to Germany's surrender. Spires concludes that success of tactical air power demonstrated by Patton and Weyland resulted from four developments: the maturation of doctrine; effective organizational procedures; better equipment; and most importantly, pragmatic leaders.<sup>4</sup> Spires overstates the impact of technical developments but is correct to focus on the pragmatism of Weyland and XIX TAC. Spires identifies the unanimous concurrence by ground commanders on the need for air superiority prior to other operations. Importantly, Spires notes that Weyland never focused on the Luftwaffe of ground support.

A post-WWII report by LTC (Dr.) Kent Greenfield summarized the development of pre-war doctrine and AGF-AAF teamwork during WWII. Greenfield accurately conveys how doctrine, embedded in FM 31-35 *Aviation in Support of Ground Forces*, led to major air-ground cooperation issues during 1942 and during the North African campaign. However, the major issue between the AGF and AAF was not FM 31-35, but their respective interpretations of it.<sup>5</sup> For example, after publication of FM 31-35 in April 1942, the AGF developed a program of air-ground training that during maneuvers at the Desert Training Center and other locations. However, AAF participation “fell

considerably short of requests of the [AGF].”<sup>6</sup> Once the AAF published FM 100-20 in July 1943, air-ground instruction in AGF schools fell “into neglect during 1943-44 with the feeling that air had become an arm apart from the others.”<sup>7</sup> This created the lack of air-ground communications and cooperation seen in France during 1944.

Vietnam sources include Ian Horwood’s *Interservice Rivalry and Airpower in the Vietnam War*. Horwood covers air power in general during Vietnam with a chapter dedicated to CAS. He also reviews the developments in Army-Air Force relations prior to Vietnam, and the impact of the helicopter on CAS war. John J. Sbrega’s essay “Southeast Asia” in *Case Studies in the Development of Close Air Support* focuses on CAS in Vietnam. Sbrega breaks the war into three phases: prior to 1965, significant US involvement though 1969, and Vietnamization of the war from 1969-1973. Together, Sbrega and Horwood paint a picture of Army-Air Force rivalry in Vietnam; one that culminated with the 1968 Johnson-McConnell Agreement that placed armed helicopters squarely under the auspices of the Army while the Air Force retained nearly all FW aircraft.<sup>8</sup> Given the preponderance of helicopters in Vietnam, this satisfied the Army.

Air Mobility development directly relates to the Army-Air Force CAS. A post-Vietnam RAND study, “Army-Air Force Relations: The Close Air Support Issue,” summarizes many interservice CAS issues, leading into the debate between the AH-56 Cheyenne and the A-10. The originally classified study illustrates the USAF preference for multi-role jets designed for Interdiction as opposed to CAS. The authors declared that the Air Force had lost the Army’s trust concerning CAS. Therefore, it “will be difficult for the Air Force to recapture exclusive responsibility for the function, largely because the Army concept of the land battle which, after all, is the basis for tactical air as well as

ground forces, will probably prevail, whether the Air Force agrees or not. More likely seems the evolution of a *modus vivendi* for sharing the function between the services.”<sup>9</sup>

The first major report on Desert Storm was the “Gulf War Air Power Survey,” published by Johns Hopkins University's School of Advanced International Studies in 1993. While the survey is unbiased, it strictly looks at the air component of the war. As a result, it tends to overstate the impact of air campaign, reducing events to targets struck and sorties flown, rather than analyzing air power’s impact on the overall effort. Of particular note is the 1997 Government Accounting Office (GAO) report, “Evaluation of the Air Campaign.” The report challenges some of the military assertions about the effectiveness of expensive weapons such as the F-117 and precision-guided weapons.

Iraq and Afghanistan sources focused on major combat operations at the beginning of the conflicts. These operations were the focus for two reasons. First, these demonstrate the majority of interservice friction due to the competing USAF requirements of CAS and Interdiction in conjunction with ground maneuver. Second, after the initial invasions (Anaconda in Afghanistan) the vast majority of operations consisted of less than brigade-level units and steady-state air support procedures. Sources for Operation Anaconda include interviews with MG Hagenbeck, the JTF commander. Hagenbeck has been criticized for disjointed planning, prior to Anaconda. However, many sources fail to account for the significant limitations placed on CTF Mountain by Defense Secretary Rumsfeld or the vast distances between Kabul and the air component in the Persian Gulf.

Second, a monograph by historian Charles Kirkpatrick examines the effective air-ground fires and integration by V Corps and the 4th ASOG during the invasion of Iraq.

Kirkpatrick correctly identifies that V Corps was successful due to the close cooperation between the corps headquarters and the ASOG as well as the willingness of the ASOG commander, LTC McGee, to set aside air doctrine and focus the ASOG's procedures on supporting the corps. Just as importantly, Kirkpatrick identifies that the ASOG moved with the corps headquarters.

### Service Doctrine

During WWII, the AAF had two principle doctrines, FM 31-35 and, after mid-1943, FM 100-20. FM 31-35 represented the first attempt to codify the relationship between the AGF and the AAF. Though it was a compromise document, the AAF did not concur with FM 31-35, because they felt it constrained their flexibility without acknowledging the need to mass air power. Because of the adversarial relationship between the AGF and AAF, the American military began the European War not only inexperienced, but with serious issues in cooperation and doctrine between ground and air forces. The prevailing thought within the AAF was that centralized control would facilitate flexibility and allow for massing toward operational and strategic effects. Moreover, the doctrine of air power independence, coupled with a belief that supporting ground forces was futile, had embedded itself within AAF culture.<sup>10</sup> FM 100-20, *Command and Employment of Air Power*, was a concerted effort by AAF commander, GEN Hap Arnold, BG Laurence Kuter, and the AAF Staff that reflected British influence.<sup>11</sup> Published in July 1943 without the consent of the AGF, FM 100-20 demonstrated AAF preferences toward Interdiction and Strategic Bombing.<sup>12</sup>

FM 100-20 reflected the significant disagreements that developed in North Africa revolving around the C2 of aircraft and their larger purpose in the war. The AAF desired

an emulation of the British System, centralizing all aircraft under a single commander. FM 100-20, however, did not accurately portray the actual principles the British employed.<sup>13</sup> Indeed, Field Marshall Bernard Montgomery, the British 8th Army commander, expressed a concern that the new AAF doctrine “would sanction an inflexible system of centralized control of air forces in a theater.”<sup>14</sup> The autonomous Royal Air Force actually operated in concert with overall operational plans developed by ground commanders, rather than solely focusing on its own objectives. Army Ground Forces commander, LTG McNair viewed FM 100-20 as a testament to the “indifference of the Air Staff to cooperation of air with ground forces.”<sup>15</sup> Assistant Secretary of War McCloy was more direct, stating, “It is my firm belief that the Air Forces are not interested in this type of work [ground support], think it is unsound, and are very much concerned lest it result in control of Air [sic] by ground forces. Their interest, enthusiasm, and energy are directed elsewhere.”<sup>16</sup> FM 100-20 reflected AAF parochial views and a long-standing desire for service autonomy. Functionally, however, the document’s main influence was a clear delineation between tactical and strategic air forces along with changes in organizational structures; while AAF organization and resource priorities trended toward the strategic air forces, it allowed freedom for tactical air force leaders.

Air Force doctrine development from the 1930s through independence in 1947 to the present day is a relatively simple expansion of the air power theories developed during the 1920s by theorists like Giulio Douhet and BG William Mitchell. Classical air power principles primarily include the “decisiveness” of air power, the requirement for an autonomous air force, and the importance of attacking the enemy’s cities or centers of gravity, as opposed to his fielded forces.<sup>17</sup> Douhet’s *The Command of the Air* espouses

air power's freedom and ability to "go far behind the fortified lines of defense without first breaking through them. It is air power which makes this possible."<sup>18</sup> Both Mitchell and Douhet believe the airplane ushered in "a new form of warfare" or an "aeronautical era."<sup>19</sup> Both, while focusing on destructive bombing, believe airpower can "decisively" shorten warfare.<sup>20</sup>

Richard I. Wolf traces this evolution and the pertinent agreements in *The United States Air Force: Basic Documents on Roles and Missions Air Staff Historical Study*. Wolf introduces each agreement or major doctrinal change as well as the source document. This source provides much of the material for Army-Air Force agreement chronology shown in Appendix A.

Warden's *The Air Campaign*, though not strictly a doctrinal manual had a distinctive impact on USAF doctrine. It is a selectively historical, systematic view of the application of air power. Warden analyzes the characteristics of air power as well as aspects such as Interdiction priorities and how best to employ air assets. Warden's views on CAS reflect USAF institutional view.

For this paper, the most pertinent Air Force doctrine publications are Volumes 1, 2, and 3, *Basic Doctrine, Command, and Operations*, respectively. USAF doctrine focuses on the application of air power at the operational level and higher. Aspects of air power such as its flexibility, speed, and concentration are espoused throughout USAF doctrine along the requirement to centralize air power under a single air commander. *Basic Doctrine* outlines service's basic missions. Annex 3-03 *Counterland Operations* outlines CAS and Interdiction. This publication begins with claiming that air power "destroyed" the Iraqi Army in 1991 and 2003 before declaring that, "By dominating the

surface environment, Counterland operations can assist friendly land maneuver while denying the enemy the ability to resist.”<sup>21</sup> *Counterland Operations* reflects air power tenets such as a focus on “key targets” and “decisive points” to “shatter” enemy resistance and goes so far as to declare air power, rather than supporting land forces, “can serve as the main attack and be the decisive means.”<sup>22</sup> 3-03 illustrates the USAF vision of how best to employ air power near ground troops, only at “decisive points,” rather than in isolation because “CAS rarely achieves campaign-level objectives.”<sup>23</sup> 3-03 repeatedly makes clear that CAS aircraft are only supporting the ground commander while remaining under the control of the ACC, which receives prioritization from the overall JFC.<sup>24</sup> Overall 3-03 restates the air power principles of Douhet and Mitchell and provides multiple caveats for CAS while emphasizing the effectiveness of Interdiction.

The primary doctrinal reference for Army operations is ADRP 3-0 *Unified Land Operations*, which outlines the two core competences of the Army: Combined Arms Maneuver and Wide Area Security. In many ways, ADRP 3-0 attempts to reconcile the Army’s need to remain proficient at high-intensity conflict and the likelihood of executing Stability operations such as counterinsurgency and humanitarian assistance. Army doctrine references CAS as vital in many places, though only obliquely. Army FM 3-04.126 *Attack and Reconnaissance Helicopter Operations* is the doctrinal manual for Army attack helicopters, which operate as a part of organic maneuver. The manual clearly states that Army helicopters do not perform CAS, though the CCA is very similar. FM 3-04.111 *Aviation Brigades* describes the structure and employment of the CAB.

The primary sources for CAS doctrine are JP 3-09.3 *Close Air Support*, the JFIRE *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of*



*Firepower*, JP 3-30 *Command and Control of Joint Air Operations*, and DoD Directive 5100.01, which outlines the major functions of the services. Interesting DoD Directive 5100.01 assigns CAS to each service, except for the Army, which arguably needs it the most.<sup>25</sup> JP 3-09.3 outlines the CAS procedures and guidelines for employment, as well as JTAC guidance. Another multi-service publication, ATP 3-52.2 describes the joint Theater Air-Ground System. In the case of the Army and Air Force, the air-ground system contrasts starkly with the Navy-Marine system in terms of proximity of air units to ground units. (Appendix G).

#### Aircraft Capabilities and Cost Data

DoD flying hour compensatory rates provided the majority of cost data for current American aircraft. This data represents the cost agencies must reimburse to DoD when military aircraft are used providing an equivalent means to evaluate costs. Fortunately , the DoD data includes AT-6 data from a USAF pilot program. This allows for fair comparison of aircraft costs. Actual aircraft cost came from three sources. For aircraft in production such as the AH-64E and F-35, the DoD comptroller produces documentation. These were averaged over the past three years to obtain an accurate cost. For legacy aircraft such as the A-10 and F-16, GlobalSecurity.com provided the unit cost in FY97, which was adjusted to current dollars. This is open-source, but represents the unit cost well into production.

Aircraft capability and characteristic data came primarily from two sources. The first is unclassified aircraft capabilities (cape) briefs from the Air Force Weapons School in Nellis AFB, NV. Capes briefs provide information on aircraft communication, station-

time, and weapons capabilities. AT-6 and A-29 data came from the respective manufacturers and open sources such as GlobalSecurity.org

### Research Papers, Theses, and Journal Articles

The near circular evolution of Army Aviation doctrine from Vietnam to the present is the subject of COL Russell Stinger's, "Army Aviation—Back to its Roots." Stinger chronologically demonstrates that Army Aviation began as a component of Air Mobile operations in Vietnam, providing "over the shoulder fire support." It then went on to focus on deep operations as a component of AirLand Battle before returning to air-ground teamwork during the War on Terror. In "The Comanche and the Albatross," published in *Air and Space Power Journal* (May 2014), USAF COL Michael W. Pietrucha, argues the Air Force should cancel the F-35A, like the Army's Comanche.

Two USAF Officers wrote pertinent papers. This first was LTC Barry Watts' "The Foundation of US Air Doctrine." Watts identifies several issues with USAF. Watts argues that "the key assumptions underlying maintain US doctrine for conventional air ware have not evolved appreciably since ACTS theorists elaborated their theory of precision, industrial bombardment during the 1930s."<sup>26</sup> Watts believes USAF doctrine is "fundamentally flawed," because it relies on an overly mechanistic approach that does not account for enemy action or friction.<sup>27</sup> Second, in "Abdicating Close Air Support: How Interservice Rivalry Affects Roles and Missions," LTC Steven Olive describes CAS issues as a "as symptom of the larger ill of unhealthy inter-service rivalry."<sup>28</sup> Olive correctly identifies the service views and trends that create friction.

Another monograph used was "Cleared to Engage-Improving Joint Close Air Support Effectiveness" by Marine Corps MAJ Michael Johnson. Johnson acknowledges

the importance of CAS to contemporary US Military operations by analyzing Operation Anaconda and operations in Iraq against current CAS doctrine. He correctly identifies the problem of the Army using the term CCA as opposed to CAS, which creates confusion and gaps in joint doctrine.<sup>29</sup> Johnson also identifies problems with using aircraft like the B-52 and B-1 for CAS: “This shift in CAS support coming from other aircraft traditionally not tasked for the mission has resulted in aircrews supporting the mission with little or no understanding of the ground scheme of maneuver or intricacies of an integrated fire-support plan.”<sup>30</sup> He has several recommendations, including establishing a joint CAS training requirement, elevating CAS’s importance within the USAF, and creating a weapons school for Army Aviation.

Five theses helped provide perspective on issues and personalities involved in this paper’s analysis. The first was MAJ Scott Hasken’s “A Historical Look at Close Air Support.” Using many of the same case studies as this thesis, Hasken argues that the Army and Air Force have failed to develop an effective CAS relationship and must focus on “training, doctrine, trust, and dialogue.”<sup>31</sup> Second, MAJ Steven Tittel’s “Cost, Capability, and the Hunt for a Lightweight Ground Attack Aircraft,” makes the case for a USAF turboprop. Using cost and low-end capability as a rationale, Tittel argues that the USAF needs such as aircraft. However, Tittel fails to address the Air Force’s need to focus on high-end threats and his service’s bias against non-jet aircraft.

That bias toward high-end jets as an object is the subject of “The Warthog: The Best Deal the Air Force Never Wanted,” by Arden Dahl. He explains the competing post-Vietnam interests such as Congress, the Army, and the Air Force, that intersected to create the A-10. The Air Force was predisposed against a CAS-specific aircraft until the

Army began developing a high-speed helicopter, at which point the USAF proposed the A-10 “to keep the Army out of the CAS mission.”<sup>32</sup> In “Gen Otto P. Weyland, USAF Close Air Support in the Korean War,” MAJ Michael Chandler’s astutely recognizes Weyland’s influence on tactical air power during the Korean War and argues that he was instrument in forging an effective CAS system in Korea.<sup>33</sup> Based on Weyland’s WWII experiences, he provides a vivid contrast in how far apart the Army and Air Force were on the subject of tactical air support in Korea.

Lastly, the difference between Army CCA and CAS is the subject of a monograph by Army MAJ Patrick Wilde, “Close Air Support versus Close Combat Attack. Wilde demonstrates that the Army’s use of the CCA term was less about what it needed from helicopters and more about semantically differentiating Army helicopters from Air Force CAS to protect the helicopter as a fire support asset.

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<sup>1</sup> Dolan, 1-2.

<sup>2</sup> Howze Board, “Final Report,” 1, 57.

<sup>3</sup> Ibid., v.

<sup>4</sup> Spires, *Patton’s Air Force*, 297-298.

<sup>5</sup> Greenfield, 9.

<sup>6</sup> Ibid., 10.

<sup>7</sup> Ibid., 129.

<sup>8</sup> Horwood, 28; Sbrega, 455.

<sup>9</sup> Goldberg and Smith, viii-ix.

<sup>10</sup> Watts, xv.

<sup>11</sup> Greenfield, 48.

<sup>12</sup> James A. Huston, “Tactical Use of Air Power in World War II: The Army Experience,” *Military Affairs* 14, no. 4 (1950): 168.

<sup>13</sup> Huston, 168.

<sup>14</sup> Greenfield, 48.

<sup>15</sup> *Ibid.*, 49.

<sup>16</sup> *Ibid.*, 50.

<sup>17</sup> Giulio Douhet, *The Command of the Air* (1921), trans. Dino Ferrari (Washington, DC: Office of Air Force History, 1998); Mitchell, 509-518.

<sup>18</sup> Douhet, 9.

<sup>19</sup> Douhet, 3; Mitchell, 431.

<sup>20</sup> Mitchell, 434-447.

<sup>21</sup> Department of the Air Force, Annex 3-03 *Counterland Operations* (Maxwell AFB, AL: GPO, 2014), 2-3.

<sup>22</sup> *Ibid.*, 5.

<sup>23</sup> *Ibid.*, 10.

<sup>24</sup> *Ibid.*, 61

<sup>25</sup> Department of Defense, Directive 5100.01.

<sup>26</sup> Watts, xv.

<sup>27</sup> *Ibid.*

<sup>28</sup> Olive, i.

<sup>29</sup> Johnson, 5.

<sup>30</sup> *Ibid.*, 6.

<sup>31</sup> Hasken, iii.

<sup>32</sup> Dahl, 12-13.

<sup>33</sup> Chandler, 1-3.

## CHAPTER 4

### RESEARCH METHODOLOGY

Powerful forces are pulling the ground commander one way and the air commander another.

— John A. Warden III, *The Air Campaign*

This chapter briefly describes the steps taken to obtain relevant information regarding the historical background, contemporary organization, and doctrine, and cost information before analyzing the methodology's strengths and weaknesses. The research aimed to evaluate the historical effectiveness of an Army-Air Force team performing CAS and then determine how that relationship compared to the current CAB organization. The use of primary sources and a reliance on USAF histories and statistical summaries is an attempt to mitigate any bias in research. A goal of the historical analysis was to analyze Army-Air Force CAS relationship changed since WWII. Inherent in this analysis was finding the desired traits of CAS aircraft from a ground perspective. The last goal was to analyze the cost and capabilities of FW attack aircraft to examine the capability gap between Army helicopters and USAF CAS.

#### Steps Taken to Obtain Information

Visits to the Library of Congress and National Archives provided much of the information concerning the 3rd Army-XIX TAC relationship. The Patton, Vandenberg, Quesada, and Spaatz papers provided firsthand accounts of AAF operations in Europe. The records of the 9th Air Force, 3rd Army, and XIX TAC, were located at the National Archives. The Ft. Leavenworth Combined Arms Research Library provided hard copy books or archival reports from Korea, Vietnam, and Desert Storm. Research generally

focused on conflicts and the air-ground systems developed. Research progressed from general to specific by reviewing background information first, followed by specific sources. Research information and sources aligned with the categories from chapter 3.

Three primary research objectives in this study answered the primary and secondary research questions listed in chapter 1. These objectives were designed to gain a historical and doctrinal understanding of the development of the Army-Air Force CAS relationship and prohibition on Army FW ground attack aircraft. Contemporary aircraft cost and capability information came primarily from three sources: DoD, manufacturer data, and open source. An important note is that the DoD data only accounts for the fuel and maintenance, aggregated into an hourly cost.

### Analysis

Using historical data, the research found an example of effective CAS and compared that to Army CAB. For the contemporary analysis, DoD flying hour costs were averaged for FY10-14 to reduce variability with the AT-6 increased by 25 percent to account for militarization and other modifications. Lastly, research compiled and analyzed cost and capability data for a variety of attack aircraft, using both hourly cost and a 5,000 life span to present a “true cost of ownership” used in chapter 5.

### Strengths, Weaknesses, and Bias

The strength of this research methodology lies in the use of primary sources to analyze historical examples from a major conflict. A common objection to a non-jet aircraft performing CAS is survivability. While the technology has changed since WWII, arguably no airmen faced the challenges of distance, enemy aircraft, and massed air

defenses seen by airmen in Europe. Analyzing a historical precedent also tempers contemporary arguments surrounding CAS, particularly the C2 arrangements. WWII doctrine clearly separated ground and air forces, but XIX TAC and 3rd Army developed an effective system. If the research demonstrates that CABs and TACs were similar, an implication is that the means used (aircraft) by each should not be artificially limited.

This study utilizes a cost comparison between jets, helicopters, and turboprop aircraft. Military procurement generally focuses on the capabilities desired by operational forces rather than the cost. This argument, however, has substantial strength in light of current and future budget cuts to all military services. Arguably, the US military spent the last decade using high-tech aircraft to fight low-tech wars. The result is an USAF fleet that is “flown-up” when cheaper aircraft could have performed the same mission.

Admittedly, this methodology has weaknesses. Comparing and contrasting the modern CAB to the historical TAC provides an interesting example, but alone does not necessarily imply that the Army should adopt FW attack aircraft. It does suggest, though, that there is a capability gap between the CAB and the TAC, as well as between Army helicopters and USAF jets. Additionally, although cost is a concern for the services, so is avoiding duplication of effort between platforms. The prohibition on Army FW attack aircraft is an attempt to avoid duplication. This study attempts to demonstrate that a turboprop Army aircraft would augment and supplement USAF CAS.



## CHAPTER 5

### ANALYSIS

Air-ground teamwork in combat on the battlefields of the ETO at last became a reality.

— LTC Kent Greenfield,  
*Army Ground Forces and the Air-Battle Team*

The Army does not own any FW attack aircraft due to DoD agreements and a preference for helicopters that developed in Vietnam. Helicopters provide the Army organic air power without conflicting with the Air Force. This limits USAF CAS to a “fires” role as opposed to full integration. Helicopters, however, have limitations in terms of range and speed. This chapter conducts an analysis asking: Is there a precedent for an Army FW attack aircraft? By considering the 3rd Army-XIX TAC relationship from WWII and comparing it to the modern CAB, this chapter establishes a precedent for an Army FW attack aircraft within the CAB. The chapter ends with a contemporary rationale for an Army FW attack aircraft, considering cost and capabilities.

#### Historical Precedent: 3rd Army and XIX Tactical Air Command

The cooperation between XIX TAC and 3rd Army provides perhaps the ideal example of effective air-ground cooperation on a large scale. After action reports reveal the extent to which the XIX TAC had earned the trust and appreciation of GEN Patton, who lauded the XIX TAC in a message shortly after the war ended, “The utmost has been achieved in the cooperation between ground and air in the experiences of the [3rd Army] and XIX TAC. It would be extremely difficult to make general recommendations for improvement.” A 1945 *Time* magazine article went further, stating, “If other top airmen

[Arnold and Spaatz] had any criticism of the Ninth, it might be that its bosses had got to working too closely with ground-force commanders.”<sup>1</sup> Patton described his air support: “Our success is built on mutual respect and comradeship between the air and ground.”<sup>2</sup> For his part, Weyland realized that the AAF had oversold air power’s capabilities and effective employment required a “realistic view of the air.”<sup>3</sup> The Patton-Weyland team was a superb example of close air-ground integration and the effects that teamwork, coupled with mutual understanding, can create. Weyland clearly benched both doctrine and AAF bias to provide outstanding support.

Though FM 100-20 gave CAS low priority, characterizing it as the “most difficult to control, [the] most expensive, and, in general, [the] least effective,” XIX TAC demonstrated effectiveness coupled with a low loss rate.<sup>4</sup> Additionally, the lower operating altitudes of the fighter-bombers allowed them to fly in weather that grounded the bombers. Despite operating from improvised sites spread across France and England, the 9th Air Force averaged nearly twenty-eight flying days per month from May 1944 to V-E Day while 8th Air Force bombers, flying from England averaged just over twenty.<sup>5</sup>

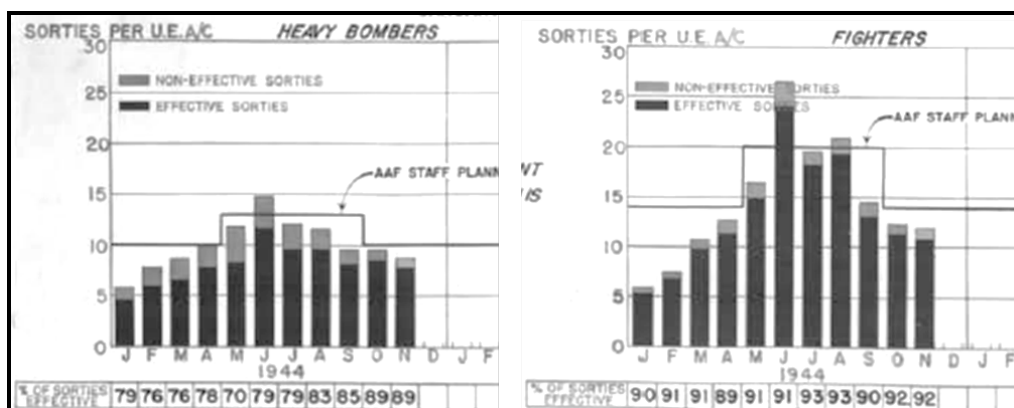


Figure 12. Comparison of Heavy Bomber and Fighter-Bomber Readiness Rates

Source: Headquarters, Army Air Forces, Office of Statistical Control, *AAF Statistical Charts 1940-1945* (Washington, DC: GPO, 1945).

Despite operating near enemy positions—viewed as foolhardy by many in the AAF—9th Air Force and XIXTAC loss rates were the same or less than heavy bombers, in terms of not only aircraft, but crews as well.<sup>6</sup> This was true for 9th Air Force medium bombers as well, despite performing missions similar to the “heavies.” 8th Air Force bomber crews had a higher probability dying in air combat over Germany than fighting the Japanese as Marine infantry.<sup>7</sup> The high loss rates continued well after the decimation of the Luftwaffe in the spring of 1944 and even as the 8th Air Force developed long-range fighter escort.<sup>8</sup> While bomber and fighter loss rates seem relatively comparable, they are strikingly different in terms of crews, with ten airmen on a bomber compared to a fighter-bomber’s single pilot. This meant bombers had a higher attrition rate for aircrews, in addition of high aircraft loss rates.<sup>9</sup> The lower loss rates of tactical aircraft were, in part, a result of the close cooperation enjoyed with the ground forces.

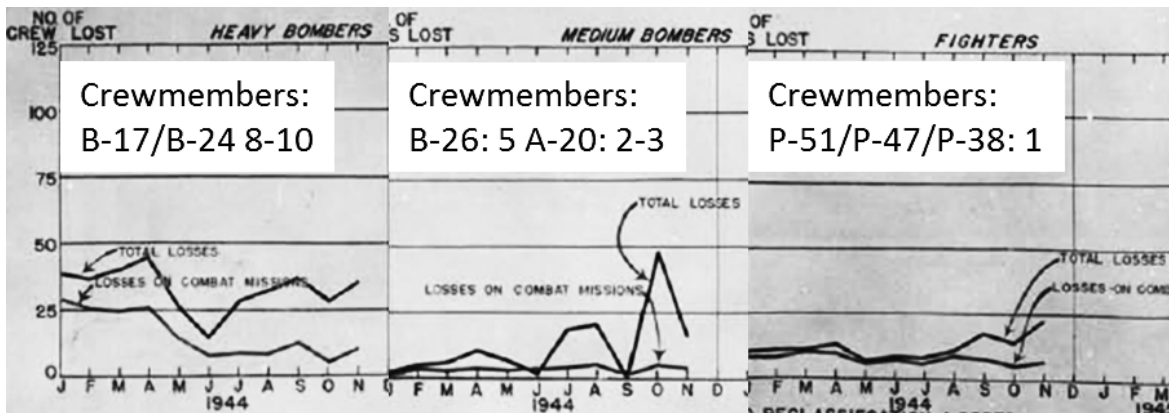


Figure 13. Aircraft Crew Loss Rates per 1,000 sorties January-November, 1944

Source: Headquarters, Army Air Forces, Office of Statistical Control, *AAF Statistical Charts 1940-1945* (Washington, DC: GPO, 1945), 26. Author's addition of crewmember data.

Adjacent headquarters created mutual understanding; this allowed better planning for pilots. XIX TAC pilots would coordinate with 3rd Army battalions to “black out” flak when encountered, rather than suffer through it like the heavy bombers.<sup>10</sup> Fire support was a hallmark of the AGF divisions and air-ground cooperation enhanced this support.<sup>11</sup> As Weyland remarked in December 1944, “Well, we help them and they help us.”<sup>12</sup>

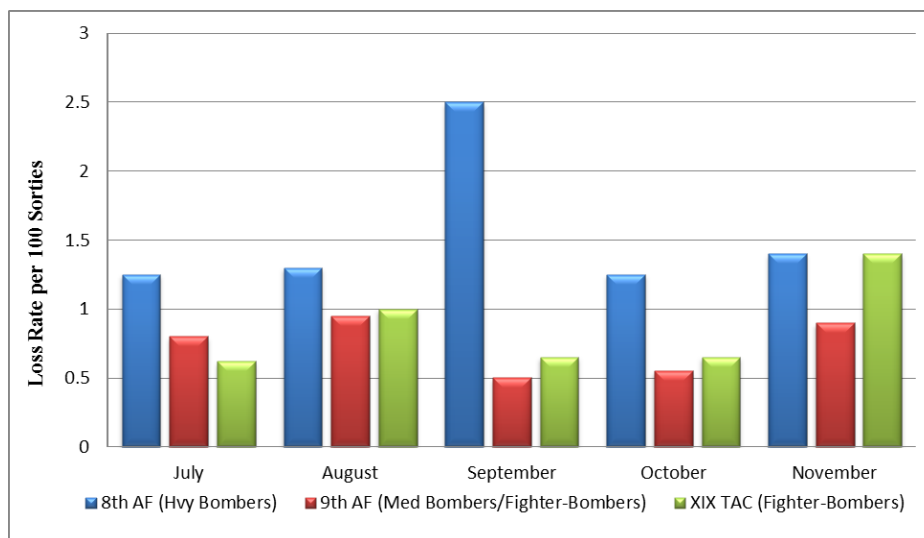


Figure 14. Aircraft Loss Rates, July–November 1944

*Source:* Author's compilation of *XIX TAC Statistical Summary 1 APR 1944–8 MAY 1945*, Record Group 165: Records of the War Department, National Archives, College Park, MD; Headquarters, Army Air Forces, Office of Statistical Control, *AAF Statistical Charts 1940-1945* (Washington, DC: GPO, 1945).

Close coordination, combined with lower operating altitudes and direct communication, greatly enhanced the effectiveness of the XIX TAC fighter-bomber teams. In terms of accuracy, fighter-bombers were substantially more accurate than the 8th Air Force heavy bombers. Whereas bombers rarely exceeded 20 percent of bombs within 1,000 feet of the target, fighter-bomber attacks using armor piercing .50 caliber machinegun fire and rockets were often conducted with pinpoint accuracy.<sup>13</sup> During the sweep across France one American division commander remarked, “The best tank destroyer we have is a P-47.”<sup>14</sup> As early as August 1944, American ground forces employed tactical air power as quickly and effectively as organic artillery; more effectively, perhaps, because the fighter-bombers could identify and destroy discreet targets, such as tanks and other vehicles that artillery could only suppress.<sup>15</sup>

Another of the critical factors in the success of the 3rd Army-XIX TAC team was joint planning. It was not enough to co-locate headquarters; integration was critical as well. Each headquarters, 3rd Army and XIX TAC, endeavored to incorporate the other into its battle rhythms and staff processes. Weyland personally attended Patton's operations meeting each morning and the XIX TAC staff conducted a joint planning session every night that considered the "enemy front in ground and in the air during the day," along with input from the 3rd Army G-3, who "presents to my staff what they would like the air to do on the following day."<sup>16</sup> The joint planning resulted in mutual understanding of the current situation but, more important, coordinated 3rd Army and XIX TAC efforts across the battlefield. In an early December 1944 interview, Weyland summarized the teamwork:

The one I have particular in mind is the mutual respect and comradeship that has been built up between all elements of the XIX TAC and the 3rd Army. My boys like the way the 3rd Army fights. The 3rd Army goes ahead aggressively. My kids feel that this is their Army. They feel quite a definite sense of superiority in that respect over their cohorts. . . . I think you can quote that our success is built greatly on mutual respect and comradeship between the air and ground.<sup>17</sup>

Though he was not Patton's direct subordinate, Weyland understood his unit effectively worked for 3rd Army. Weyland refused to "wave an AAF flag or FM 100-20" or explicitly follow AAF doctrine with regard to CAS.<sup>18</sup> Patton reciprocated his trust, even recommending that Eisenhower make Weyland a corps commander.<sup>19</sup> In a December 1945 letter to Weyland, Patton said he believed air-ground cooperation was merely "in its infancy."<sup>20</sup> Whereas the other American field armies only obliquely reference their supporting TAC, the 3rd Army daily summary lists XIX operations, as if the airmen were part of 3rd Army; because, they effectively were.

After the war, there was significant debate surrounding the effectiveness of the Combined Bomber Offensive against Germany compared to the impact of the 9th Air Force's tactical actions. Metrics such as effectiveness, sortie rate, and tons of bombs dropped distorted the analysis. In the end, Germany surrendered to Army ground forces, which employed tactical air power effectively, making it instrumental to the success of the ground forces. Patton and Weyland provide the premier example of what an effective air-ground team may accomplish through mutual understanding, close cooperation and proximity, as well as a willingness to set aside doctrine and service parochialism.

While AAF catalogued and compiled statistics for post-war analysis, something was lost in translation. For the soldier on the ground, air power was not a function of sortie rate or mission effectiveness; it was a matter of trust, that when he called for support, the fighters would show up, enabling him to survive an attack or maneuver toward the objective more easily. In this aspect, the 3rd Army-XIX TAC team excelled.

#### Similarities between WWII TACs and Modern CABS

WWII TACs, despite being a part of the AAF, were aligned with ground forces. The effectiveness demonstrated by Third Army and XIX TAC was the result of mutual understanding and close proximity. The Combat Aviation Brigades (CABs) structure provides a similar level of support and integration to ground units.

From the beginning of both small and large-scale operations, the XIX TAC and 3rd Army headquarters collaborated, allowing the Patton's headquarters to understand "limitations as well as capabilities."<sup>21</sup> During operations, the close proximity of XIX TAC and 3rd Army headquarters allowed for bottom-up refinement of plans. Weyland enhanced this by devolving authority to his flight squadrons to enhance cooperation.

Close coordination was enabled because fighter-bomber groups developed habitual working relationships with divisions and Regimental Combat Teams. Additionally, Weyland, while keeping his airmen in charge of aircraft, did not blindly follow FM 100-20's guidance regarding AAF autonomy. He remarked, "We give [ground forces] fighter-bombers which are practically turned over to them."<sup>22</sup> Ground commanders could talk directly to aircraft and they worked with the air units habitually. Furthermore, like the current modern CAB and unlike modern USAF air support doctrine (Appendix G), XIX TAC and 3rd Army operations, down to the regimental level, were "planned, discussed, and arranged together . . . allowing for absolute homogeneity between air and ground."<sup>23</sup>

Comparing the doctrinal missions and organization of the TACs and CABs illustrates the similarities. Though different in scale and scope—XIX TAC averaged over 400 aircraft and 12,000 personnel, while the Army CAB contains around 120 aircraft and 3,500 personnel.<sup>24</sup> The relationship to ground forces and mission-focused cooperation are very similar. In fact, the CAB performs missions other than attack or reconnaissance, assisting with air movement as well as Air Assault operations. Nevertheless, there are more similarities than differences between the TACs and CABs (table 2).



Table 2. Similarities between TACs and CABs		
Organization	Tactical Air Commands	Combat Aviation Brigades
<b>Missions</b>	Close Air Support Interdiction Deep Interdiction Dive Bombing Counter-air Reconnaissance	Reconnaissance/Security Movement to contact Attack Air Assault Air movement C2 support
<b>Enabling Operations</b>	Signal (Wire) Installation Air Traffic Services Leaflet dropping	Forward Arming- Refueling Downed Aircraft Recovery Air Traffic Services Unmanned Aerial Systems
<b>Subordinate Organizations</b>	Fighter Groups Fighter-Bomber Groups Reconnaissance Group Night Fighter Groups	Attack-Reconnaissance Battalion(s) Assault Battalions General Support Battalion
<b>Proximity to Ground Force</b>	Close proximity or co-located. Moved with ground unit.	Co-located or close proximity. Can function as maneuver HQ.
<b>Relationship to Ground Forces</b>	Close Cooperation at the HQ level. Coordination with units.	General support to Army Division/JTF with occasional direct support.
<b>Higher HQ</b>	Tactical Air Force	Division, Corps or JTF

*Source:* 9th Air Force Charts, Vandenberg Papers, Library of Congress, Washington, DC; HQ, AAF. *Condensed Analysis of the Ninth Air Force in the European Theater of Operations* (1946; repr., Washington, DC: Office of Air Force History 1984); Headquarters, War Department, FM 100-20 *Command and Employment of Air Power* (Washington, DC: GPO, 1943); HQ, Department of the Army, FM 3-04.111 *Aviation Brigades* (Washington, DC: GPO, 2003).

For ground units requesting air support, the CAB and TAC used similar procedures. Due to their close proximity and regular working relationship, 3rd Army corps and division headquarters laterally coordinated with fighter-bomber groups in XIX TAC. The signals division laid extensive wire networks to ensure communication between subordinate headquarters as well as between 3rd Army and XIX TAC headquarters.<sup>25</sup> The effort to allow and maintain lateral communication between subordinate units eased coordination and rapid maneuver. It also created synergy between

air and artillery efforts. Likewise, the CAB is closely aligned with Army divisions, which functions on a scale similar to 3rd Army. As opposed to coordinating through at least three echelons, each Army division has an organic CAB (Appendix G).<sup>26</sup>

This creates not only unity of command, but also common understanding, as the CAB is simply closer. Since Army helicopters do not require improved sites or long runways, they can co-locate forward with ground units. Since Korea, the USAF has not placed aircraft forward at austere sites, with very limited exceptions. While USAF aircraft can mitigate distance somewhat through speed, nothing is as effective at creating situational awareness as proximity to events. Since Army aircraft can—and are expected to—operate forward, they inherently have this trait, along with the traditional capabilities of air power such as flexibility, responsiveness, and firepower.

The difference between CCA and CAS (Appendix D) highlights the differences between a CAS and the CAB's support to Army operations. While CAS and CCA seem only semantically different, Army helicopters have the flexibility to employ fires with minimal coordination from ground units. Importantly, Army helicopters can attack targets close to friendly forces without a certified terminal controller. CAS in this type of situation places "increased responsibility" on the aircrew; on the other hand, acting without a terminal controller is the norm for Army Aviation.<sup>27</sup> This flexibility gives confidence to ground commanders, who appreciate the flexibility of Army helicopters. Though Army helicopters should understand CAS procedures, they are capable of supporting ground units without a JTAC.

The Army Division-CAB relationship mirrors the relationship that TACs and Army enjoyed during WWII. The CAB is the historical descendant of the close

cooperation utilized by the TACs. Because of the organic chain of command, close proximity, and mutual understanding created by the Army's division CAB task organization, Army aviators are able to tailor and employ air power to best suit the Army's needs. As a result, Army Aviation is responsive and well-suited for FW CAS.

### Contemporary Rationale

Air power occupies a significant place within US Strategy. The inherent flexibility, firepower, and responsiveness of aircraft allow political and military leaders a variety of options. The Air Force operates globally and with a broad mission, responsible for everything from strategic attack, to aerial resupply and CAS. Accordingly, the Air Force focuses on the high-end conflict, assuming it can "power down" to low-tech missions such as CAS. Strategic Attack and Interdiction remain the missions of choice and doctrinal, procurement, and budgetary focus for the Air Force. Ironically, air power purists continually express the "decisiveness" of air power despite overwhelming evidence of its failure when used alone. Nevertheless, CAS remains at the bottom of USAF tactical priorities, inhibiting the Army's ability to employ its own doctrine.

A 2003 study found CAS training deficient in 15 areas, even with recent joint operations during the War on Terror. The services focus on intra-service training before joint operations because a need for truly joint operations only exists when units deploy, there is no need for joint home station training. The services focus on organic capabilities, maneuver, and fire support for the Army and Interdiction and air-to-air for the Air Force. USAF CAS and Army-Air Force integration become the lowest priority. While leaders in Army and Air Force units may attempt liaison and coordination, it is substantively difficult to bridge the service divide. For example, while the Army National

Training Center is near the USAF Weapons School in Nellis, NV, in the early 2000s, only 31 percent of Nellis A-10 sorties were CAS training, even less supported Army training.<sup>28</sup> To summarize a 2003 General Accounting Office report that analyzed JCAS training: When such joint training does occur, according to DOD reports, it is often ineffective.”<sup>29</sup>

Because of interservice friction and service-centric viewpoints, the Army and the Air Force seem unable to resolve the issues surrounding CAS. Complicating matters was the Army’s adoption of CCA terminology in 2003. Fundamentally, however, CCA and CAS procedures are the same, but CCA is much less restrictive because Army helicopters do not require terminal control. However, training to CCA procedures with only basic familiarity with CAS procedures makes Army Aviation parochial in an increasingly joint and multi-national operational environment. Furthermore, nearly all US allies and partners, particularly NATO allies, use CAS procedures to manage air-ground fires.<sup>30</sup>

Since before WWII, the Air Force has consistently demonstrated that it believes CAS is “a lower-priority mission or less effective use of air power than Interdiction or strategic bombardment.”<sup>31</sup> As a result, the Army makes little effort to conduct CAS training with USAF squadrons while the Air Force focuses its pilots on other missions first, assuming it can perform CAS when the need arises. While proximity to ground units and close cooperation could alleviate some of the interservice friction, the Air Force and the Army increasingly rely on technology as a substitute for personal communication. USAF LTG Michael Hostage recently wrote that technology reduced “the need for close proximity to sustain communication or to command and control airpower.”<sup>32</sup> While this

sounds reasonable, the reality is complex operations predicated mutual understanding and trust require proximity between actors.

In both training in the continental United States and overseas, USAF units are generally distant from Army units. This is due to requirements for supporting an entire theater, the logistical/maintenance burden inherent with complex aircraft, and Air Force basing. Additionally, jet aircraft generally cannot operate from austere dirt runways close to ground forces. Instead, high-performance jets require longer runways found only at major airfields. Restricting jets to runways greater than 5,000 feet excludes jets from nearly 20,000 airports outside North America and Europe.<sup>33</sup> Regardless of speed or technology, distance makes USAF CAS less responsive and USAF pilots less familiar with ground operations. Responsiveness is not just speed; it includes forward basing and proximity, both of which create mutual understanding, enabling integration. Even when Air Force squadrons operate near Army units, interservice walls make this difficult.

If the Army is to be “decisive” in land operations, it should not artificially restrict its means. While the Army has significant aviation assets, it does not have armed FW aircraft tailored to meet ground attack requirements. As a result, the Army depends on Air Force CAS, leading to questions about the Army’s real “decisiveness “if it needs [FW CAS] to fight its battles successfully.”<sup>34</sup> This situation contradicts numerous operational principles, most specifically unity of command; the commander performing a mission should control all the tools and resources directly tied to accomplishment. At the tactical level, this implies control. Army doctrine recognizes the need for CAS; it follows that the Army should own assets capable of this mission.

Modern turboprop aircraft offer the solution to fill the gap between Army helicopters and USAF jets by providing the ideal mix of cost and capabilities. Turboprops are fast enough to move quickly across a theater, but operate at slower speeds conducive to target acquisition for long periods once at the objective. They have the avionics and modern sensors found on advanced aircraft and employ common precision weapons like the AGM-114 Hellfire Missile and GBU-series GPS guided bombs.<sup>35</sup> Moreover, turboprops can loiter for greater than five hours, land at short runways or rugged strips, and provide precision fires. Compared to USAF jets and Army helicopters, turboprops are inexpensive; an entire twenty-four aircraft squadron of AT-6s, for example, would cost less than a single F-35A, slightly more than two F-15Es, or four apaches.<sup>36</sup> Given the relative simplicity of the aircraft, they require less maintenance manpower.

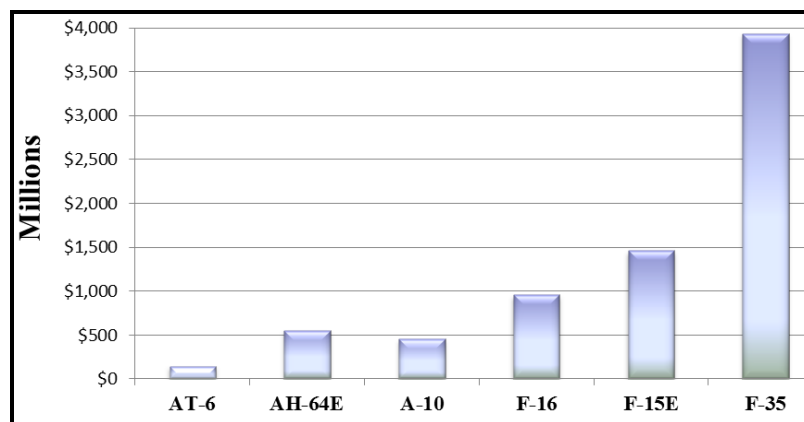


Figure 15. Cost to Purchase 24 Attack Aircraft (2014 Dollars)

*Source:* Author's compilation: Globalsecurity.org, "Aircraft Specifications," accessed May 5, 2015, <http://www.globalsecurity.org/military/systems/aircraft>; F-35 and AH-64E cost averaged using FY 14-15 data from Department of Defense, DoD Comptroller, *Program Acquisition Cost by Weapons System-FY 2015* (Washington, DC: DoD, March 2014), accessed April 28, 2015, <http://comptroller.defense.gov>; *Selected Acquisition Report-AH-64E Remanufacture* (Washington, DC: US Army, 2014), accessed April 28, 2015, <http://www.dtic.mil:document ADA613931>; AT-6C unit cost increased by 25 percent.

Appendix E shows the substantial savings provided by turboprop aircraft using an example mission. Though the example assumes a permissive environment, that is the type of threat faced by US forces in the majority of conflicts since WWII. As shown, in a single three-hour mission, an Army turboprop saves nearly \$18,000 over an Army AH-64E, but nearly \$88,000 over the F-35A. Even in situations with a significant enemy IADS or aircraft threat, that is the Air Force’s primary responsibility. CAS doctrine assumes Air Superiority as a prerequisite.<sup>37</sup> Therefore, an Army CAS aircraft should be designed assuming Air Superiority, focusing on CAS, rather than every possible scenario.

Industry offers two example models of an aircraft that would bridge the gap between Army helicopters and USAF jets. Embraer A-29 & Beechcraft AT-6B are examples of low-cost solutions can provide an “80 percent” solution for Army Aviation.



Figure 16. Embraer Defense A-29 & Beechcraft AT-6B

*Source:* Beechcraft Defense, “AT-6 Light Attack,” accessed May 5, 2015, <http://www.beechcraft.com/defense/at-6>; Embraer Defense, “Super Tucano,” accessed May 5, 2015, [http://www.embraerdefensesystems.com/english/content/combat/tucano\\_origin.asp](http://www.embraerdefensesystems.com/english/content/combat/tucano_origin.asp).

As the 3rd Army-XIX TAC team demonstrated, one of the most important aspects of successful CAS was a solid relationship between ground and air units that resulted in cooperation and common understanding between echelons. It is less about the “box,” meaning the aircraft and its technology, than it is about the “man in the box.”<sup>38</sup> However, the characteristics of the aircraft were important as well. These characteristics—from a ground force perspective—are consistent throughout history, from WWII and Vietnam, to Iraq and Afghanistan. The desired characteristics are endurance, responsiveness, precision, situational awareness, survivability, and communications with ground units. From a ground perspective, the most important factor a CAS aircraft could have was loiter ability (station time). Regardless of an aircraft’s effectiveness or speed, if it can only remain on the battlefield for a short time, it was relatively useless to the ground commander. Given a fluid tactical situation comprised of fleeting targets and the need to exploit unforeseen opportunities, an aircraft that could remain overhead for long periods was highly prized. Secondly, CAS aircraft must be responsive. Speed alone does not necessarily create responsiveness. Faster aircraft require longer runways and cannot operate from dirt strips, close to the ground units. While some aircraft have vertical/short takeoff and landing capability (AV-8B/F-35B), they sacrifice much in terms of weapons load and station time.<sup>39</sup> Furthermore, all of these types of aircraft are jets and cannot operate at low airspeeds. For this thesis, responsiveness manifests in two ways: forward basing or airspeeds greater than 200 knots. Third, CAS aircraft needed to have enough firepower to destroy targets. Fourth, CAS requires survivability.

Survivability is a historical lynchpin for CAS, which is typically viewed by air power purists as high-risk, low reward. Experience in WWII and Korea demonstrates that



CAS was not more dangerous than Interdiction.<sup>40</sup> In semi-permissive environments where the enemy does not contest air superiority or have significant air defense systems, the issue of survivability becomes moot. Survivability drives the Air Force toward high-end jet platforms that must survive in worst-case environments. However, an Army aircraft that can operate in low or medium-threat environments would be an “80 percent solution,” for significantly reduced cost. Lastly, improvements to Army aircraft in Iraq and Afghanistan including the Common Missile Warning System demonstrate the ability of industry to increase survivability. Lastly, even with JTACs, aircraft need FM radios to talk to ground units.

Comparing these characteristics in Table 3 shows that only a few platforms have the all of the desired characteristics. While loiter time is certainly dependent on the availability of refuel sites, either ground or air, it is reasonable to assume that there will be friendly locations where Army helicopters can land. Of all Army-Air Force tactical attack aircraft, only the AH-64D/E Apache and the A-10C possess all the desired CAS traits. However, the A-29/AT-6 examples possess each.

Table 3. Army-Air Force CAS Aircraft Characteristics	
Desired Characteristic	Modern Aircraft Demonstrating
Endurance (Loiter Time > 1.5 Hours between refueling)	<b>AH-64D/E</b> , AC-130H, F-15E, <b>A-10C</b> , <b>B-1B</b>
Responsiveness (Speed > 200kts)	F-16, F-15E, A-10C, AC-130H, F-35, B-1B
Responsiveness (Austere Basing)	<b>AH-64D/E</b> , A-10C
Precision Munitions	<b>AH-64D/E</b> , AC-130H, A-10C, F-16, F-15E
Survivability	AC-130H (Permissive, night only) <b>AH-64D/E</b> , <b>A-10C</b> (Semi-permissive) B-1B, F-16, F-15E, F-35 (Non-permissive)
Air-Ground Communications Ability (SINCGARS FM Capable)	AC-130H (3x), <b>AH-64D/E</b> (2-3x), A-10C (1x), F-15E (1x), F-16 (1x), F-35 (1x), B-1B

*Source:* USAF, A-10C, F-16, F-15E Capabilities Briefs (presentation, Air Force Weapons School, Nellis AFB, NV, February, 2015); Lockheed Martin, “F-35 Fast Facts,” accessed May 5, 2015, <http://www.f35.com/about/fast-facts>; Air Land and Sea Application Center, *JFIRE Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower* (Joint Base Langley-Eustis, VA: GPO, 2012).

The Air Force’s preference for multi-role aircraft pushes its procurement toward high-tech, high-cost jets. Though it started out a joint program, the F-111 is perhaps the best example of this trend. Designed to perform air-to-air combat, CAS, and low-level Interdiction, the swing-wing F-111 was overweight, overly complex, and performed poorly.<sup>41</sup> Despite the historical trend of poor performance by multi-role aircraft heavily invested in technology—the F-35 is not the first aircraft to do so—the Air Force insists that fewer, more expensive aircraft creates more capability. This flies in the face of history, military demands, and budgetary realities. Though typically framed in terms of “quality vs. quantity,” history offers many examples of high-tech weapons systems that were new actually less capable, albeit more expensive than their predecessors.<sup>42</sup>

This study utilized a mission reference frame based in the contemporary operational environment. The common refrain from the USAF is that multi-role jet

aircraft are more survivable against sophisticated air defense systems. This is completely true; however, that type of environment does not reflect the majority of scenarios the US Military actually faced in the past or projected near future. Generally, the US Military has operated with control of the sky and little to no threat from air defense or enemy aircraft. While the USAF must prepare its aircraft fleet for a sophisticated threat, CAS requires, at a minimum, local air superiority. Consequently, the Army must assume the USAF will provide air superiority, allowing Army aircraft to focus on ground forces.

Historian Martin van Creveld described the futility of cumbersome, complex weapons in *Age of Air Power*: “Finally, there are historical grounds for suspecting that the combination of very high quality and very small numbers is a typical sign of military degeneration. . . . The combination of growing cost, the slowing down of technological innovation, and declining usefulness in the most common (and often most dangerous) types of war is proving deadly to the future of the combat aircraft in particular.”<sup>43</sup> The American Military can clearly dominate a conventional battlefield, but it has difficulty adapting to limited conflict and counterinsurgency. American military aviation is no different. While the F-35 will, arguably, meet any high-end threat, expensive, high-tech jets leave an aviation gap at the low end of the range of military operations. A turboprop attack aircraft would fill this gap at the low-end of conflict for a minimal cost and have the characteristics and capabilities desired by ground commanders.

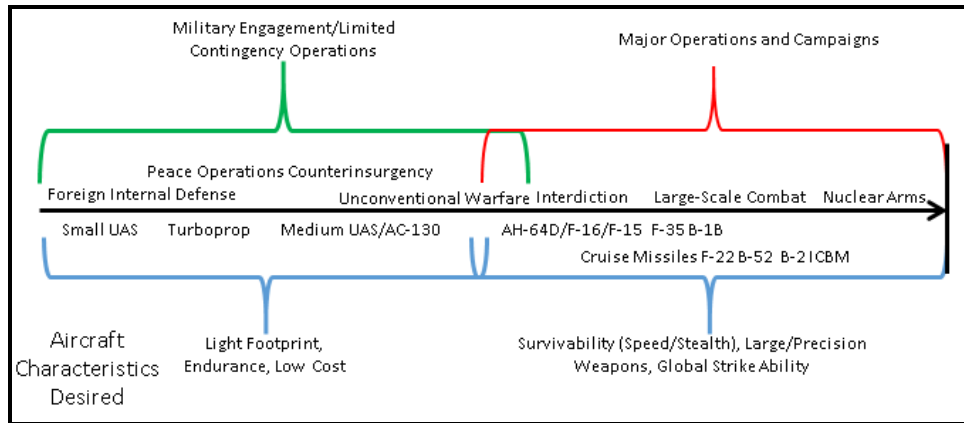


Figure 17. US Military Aircraft Across the Range of Military Operations

*Source:* Created by author.

After over a decade of combat, it makes sense to relook how the American military spends money on aircraft. Historically, the US military spends the majority of its time performing low-intensity conflict, in permissive or semi-permissive environments. In these cases, an Army FW ground attack aircraft, not necessarily designed for the worst-case air defense system, makes sense. However, just as the X Corps report noted in 1950, an aircraft performing CAS should be designed to do so.<sup>44</sup> Furthermore, the cost of a simpler aircraft, better suited to the Army's expected hybrid threat, is relatively low.

By the 1980s, the military flew less than 1/80th the sorties per dollar as it did forty years earlier.<sup>45</sup> Concurrently, the price of consumer electronics fell, making the common argument of increased technology void. The figure below reflects a similar analysis, using the total cost to buy and fly 5,000 hours for various attack aircraft. This thesis only uses AT-6 data because it is included in DoD Flying Hour cost charts. Using data from DoD charts eliminates bias; however, the AT-6 data was increased by 25 percent to represent realistic increased operational costs for a weaponized version.

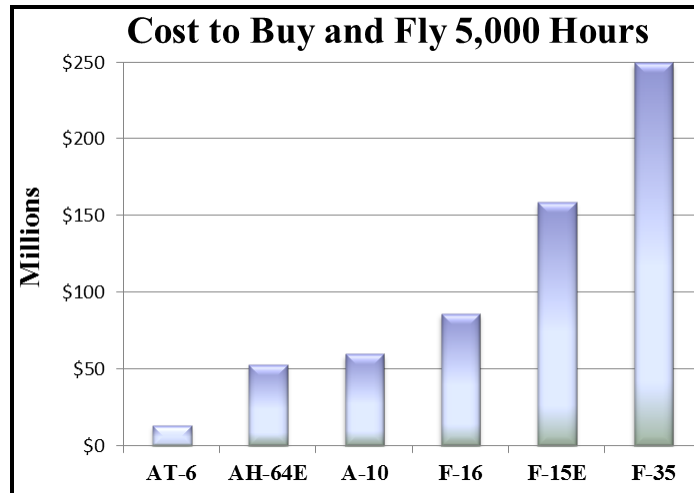


Figure 18. Total Ownership Costs per Aircraft (2014 Dollars)

*Source:* Author's compilation of Department of Defense, "Fixed Wing and Helicopter Reimbursement Rates," Financial Management Repots, Fiscal Years 1996-2014, accessed April 28, 2015, <http://comptroller.defense.gov>; Globalsecurity.org, "Aircraft Specifications," accessed May 5, 2015, <http://www.globalsecurity.org>; F-35 and AH-64E cost averaged from Department of Defense, *Program Acquisition Cost by Weapons System-FY15* (Washington, DC: DoD, March 2014), accessed April 28, 2015, <http://comptroller.defense.gov>; *Selected Acquisition Report-AH-64E Remanufacture* (Washington, DC: GPO, 2014), accessed April 28, 2015, <http://www.dtic.mil>; AT-6C cost increased by 25 percent.

Turboprops are also an economical option for fulfilling JTAC training requirements. For example, in 2012, 1,400 qualified JTACs required nearly 14,000 controls from Army attack helicopters or USAF CAS-capable aircraft to remain current.<sup>46</sup> Assuming a lightweight ground attack aircraft and JTAC can complete four controls per sortie with each control lasting approximately fifteen minutes plus an hour of transit time; this means 8,440 flight hours are required for JTAC currency.<sup>47</sup> Army aircraft do doctrinally participate in JTAC training because the Army helicopters use CCA instead of CAS procedures as well as disparate basing.<sup>48</sup> CCA/CAS training flights generally utilize teams of aircraft, increasing the JTAC currency requirements to 17,000 flight hours per

year. Assuming JTAC training is supported equally by F-35, F-15E, F-16, or AH-64D/E aircraft with an average cost of \$13,064 per hour, this totals \$222,088,000.<sup>49</sup> Utilizing Army turboprop aircraft for just 30 percent of these sorties would save \$51,000,000 per year.

Lastly, a turboprop aircraft offers an economical means for the US Military to perform Security Force Assistance. Naturally, the Air Force prefers to train foreign militaries in aircraft similar to its own pilot training programs. However, most host-nations requiring military assistance (Afghanistan, Iraq, Mali, etc.) cannot afford jet aircraft. A turboprop is a realistic solution for these nations. Having a cadre of experienced military pilots to perform Security Force Assistance would aid in the US Military's efforts to build partner capacity without taking jet pilots away from the primary aircraft, as the USAF currently does.<sup>50</sup>

The F-35A, a multi-role replacement for the A-10, F-16, and F-15E, will cost significantly more than currently fielded airframes. Though more survivable, it is not designed for CAS. The F-35A will not provide long loiter time, flexibility, or low speeds ideal for CAS, though it is well suited to other USAF missions. Even with a full F-35A procurement, the overall availability of USAF aircraft will decrease due to a greatly aged Air Force fleet as a result of operations in Afghanistan and Iraq. Across the fleet, the average age is nearly forty years.<sup>51</sup> The nature of these CAS missions—long duration, long distance, and repetitive—created significant wear on the USAF fleet, pushing the average age for fighter aircraft past twenty years, consuming much of their service life.<sup>52</sup>

In Vietnam and Korea, the Air Force recognized the need for a versatile fleet of aircraft to accomplish missions with vastly different requirements. The result was a

diverse fleet that included jet interceptors, turboprop attack aircraft, and slow-flying gunships. In light of emerging hybrid threats and declining budgets, the Army should add diversity to the American military aviation fleet with a FW ground attack aircraft.

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<sup>1</sup> Meilinger, 58.

<sup>2</sup> Spires, *Air Power for Patton's Army*, 153.

<sup>3</sup> Conference between Patton, Weyland, and SHAEF Correspondents, December 9, 1944, Nancy, France, George Patton Papers; Box 12, Folder 15: Diary 1943-1945, Manuscript Division, Library of Congress, Washington, DC, 2.

<sup>4</sup> Headquarters, War Department, FM 100-20, 12.

<sup>5</sup> 9th Air Force, "Statistical Summary of Ninth Air Force Operations," 12-15; US Strategic Bombing Survey, *Air Force Rate of Operation-1945B* (Washington, DC: GPO, 1946), 15.

<sup>6</sup> Jacobs, 279-280.

<sup>7</sup> Williamson Murray and Allan Millett, *A War to Be Won: Fighting the Second World War* (Cambridge, MA: Harvard University Press, 2000), 317.

<sup>8</sup> Murray and Millett, *A War to Be Won*., 315-320; Headquarters, Army Air Forces, *AAF Statistical Charts 1944* (Washington, DC: GPO); Headquarters, Army Air Forces, *Army Air Forces Statistical Digest*, 12.

<sup>9</sup> Ibid., 12.

<sup>10</sup> Greenfield, 90; Meilinger, 51-52.

<sup>11</sup> Mansoor, 170-71.

<sup>12</sup> Patton, Weyland, and SHAEF correspondents, December 9, 1944, 5.

<sup>13</sup> US Strategic Bombing Survey, *Summary Report (European War)* (Washington, DC: GPO, 1946), 13, accessed April 20, 2015, <http://aupress.au.af.mil/Books/>.

<sup>14</sup> Greenfield, 90.

<sup>15</sup> Mansoor, 165.

<sup>16</sup> Conference between General Patton, General Weyland, and SHAEF Correspondents, December 16, 1944, Nancy, France, Patton Papers; Box 12, Folder 15: Diary 1943-1945, Manuscript Division, Library of Congress, Washington, DC.

<sup>17</sup> Patton, Weyland, and SHAEF correspondents, December 9, 1944, 5.

<sup>18</sup> Spires, *Air Power for Patton's Army*, 298.

<sup>19</sup> Ibid., 160.

<sup>20</sup> Patton to Weyland, 8 December, 1945," Patton Papers; Box 31: Correspondence, 1903-1945, Q-Z, Folder 11, Manuscript Division, Library of Congress, Washington, DC.

<sup>21</sup> Patton, Weyland, and SHAEF correspondents, December 9, 1944, 2.

<sup>22</sup> Ibid.

<sup>23</sup> Patton, Weyland, and SHAEF correspondents, December 16, 1944, 6.

<sup>24</sup> HQ, Department of the Army, FM 3-04.111 *Aviation Brigades*; XIX Tactical Air Command, *XIX TAC Statistical Summary*, 24.

<sup>25</sup> Greenberg, 39.

<sup>26</sup> Headquarters, Department of the Army, FM 3-04.111 *Aviation Brigades*.

<sup>27</sup> Joint Chiefs of Staff, Joint Publication (JP) 3-09.3 *Close Air Support* (Washington, DC: GPO, November 2014), Chapter III.52-54.

<sup>28</sup> General Accounting Office (GAO), Military Readiness Division, *Lingering Training and Equipment Issues Hamper Air Support of Ground Forces*, GAO-03-505 (Washington, DC, May 2003), 16.

<sup>29</sup> Ibid., 2.

<sup>30</sup> Joint Chiefs of Staff, JP 3-09.3, II-4.

<sup>31</sup> Johnson, 6.

<sup>32</sup> Michael Hostage, LTG, USAF, "A Seat at the Table," *Air and Space Power Journal* 24, no. 4 (Winter 2010): 18.

<sup>33</sup> Megginson Technologies, "OurAirports," accessed April 2014, <http://www.ourairports.com/world.htm>.

<sup>34</sup> Weber, 43.



<sup>35</sup> Tittel, 44-46; Beechcraft Defense, “AT-6 Light Attack,” accessed May 5, 2015, <http://www.beechcraft.com/defense/at-6>; Embraer Defense “Super Tucano,” accessed May 5, 2015, [http://www.embraerdefensesystems.com/english/content/combat/tucano\\_origin.asp](http://www.embraerdefensesystems.com/english/content/combat/tucano_origin.asp).

<sup>36</sup> Department of Defense, Office of the Under Secretary of Defense (Comptroller), *Program Acquisition Cost by Weapons System* (FY 2014) (Washington, DC, April 2013), accessed April 28, 2015, <http://comptroller.defense.gov>.

<sup>37</sup> Joint Chiefs of Staff, JP 3-09.3, xii.

<sup>38</sup> Steve Brown, Department of Joint, International, and Multi-national Operations, Army Command and General Staff College, conversation with the author, April 20, 2015.

<sup>39</sup> United States Marine Corps, AV-8B Capabilities Brief (presentation, Marine Weapons and Tactics Squadron, Yuma, AZ, March 2010); Lockheed-Martin, “F-35 Capabilities,” accessed April 20, 2015, <http://www.f35.com>.

<sup>40</sup> *Army Air Forces Statistical Digest*; Futrell, *The United States Air Force in Korea*.

<sup>41</sup> Grant Tedrick Hammond, *The Mind of War: John Boyd and American Security* (Washington, DC: Smithsonian Institution Press, 2001), 69-71.

<sup>42</sup> Pierre Sprey, “The Case for Better and Cheaper Weapons,” in *The Defense Reform Debate*, ed. Asa Clark (Baltimore, MD: Johns Hopkins Press, 1984), 194-96.

<sup>43</sup> Van Creveld, 433-34.

<sup>44</sup> X Corps, “Army Tactical Air Support Requirements,” 3.

<sup>45</sup> Hammond, 109.

<sup>46</sup> Tittel, 57.

<sup>47</sup> Ibid.

<sup>48</sup> FM 3-04.126 *Attack Reconnaissance Helicopter Operations* makes no mention of JTAC training and refers to terminal control only for Joint Air Attack Team operations. The battalion training tasks listed on the Army Training website (<https://atn.army.mil>) do not include JTAC integration.

<sup>49</sup> Department of Defense, Office of the Under Secretary of Defense (Comptroller), Chief Financial Officer, “Fixed Wing and Helicopter Reimbursement Rates,” Financial Management Reports, Fiscal Years 1996 through 2014, accessed April 28, 2015, <http://comptroller.defense.gov>.

<sup>50</sup> MacCuish, 222.

<sup>51</sup> Van Creveld, 429.

<sup>52</sup> Arthur and Eveker, *Alternatives for Modernizing U.S. Fighter Forces*, 8-10.

## CHAPTER 6

### CONCLUSIONS AND RECOMMENDATIONS

Believing we get to pick our wars is what led us to permit gaps in our portfolio—gaps that necessitated hasty improvisations undertaken at great risk and cost to ourselves.

— Tony Carr, “Futurists in Foxholes”

#### Conclusions

Air power is inherently flexible, rapid, and powerful. It can deploy from afar, creating a deterrent against potential adversaries. Once engaged, air power can quickly shape the battlefield and expand options for joint commanders. However, on its own air power cannot drastically affect the strategic situation, though air power proponents have continually claimed to do so. Because air power morphs Clausewitz’s center of gravity paradigm and decisive battle into a mechanistic application of targeting and technology, it is ineffective when not linked to other efforts. Using air power without corresponding and complementary efforts on the ground failed in Korea, Vietnam, and the Gulf War. Only in conjunction with other means, primarily landpower, can air power achieve significant effects. Never the less, the Air Force, partly to justify its autonomy and intellectual foundation, consistently oversells air power’s effectiveness. These efforts inevitably make CAS a tertiary requirement for multi-roled aircraft designed for air-to-air combat and Interdiction.

CAS is a vital requirement for Army forces. It is a requirement anchored in history and echoed in Army Doctrine, which acknowledges that the Army “depends on its joint partners for capabilities that do not reside within the Army.”<sup>1</sup> FW CAS falls within this definition but the Army’s reliance on the USAF ignores the significant historical

conflicts regarding CAS. Specific issues concerned the methodologies of CAS employment, priority of CAS apportionment, and design of CAS aircraft. Since WWII, the Air Force's global mission, and focus on air power as an independent means of national power resulted in priorities, doctrine, systems, and aircraft procurement toward multi-role jet aircraft. The unintentional result of these actions is that the Air Force considers CAS relatively unimportant and discounts fielding a CAS-specific aircraft, as shown by the current debate regarding the A-10 and F-35A. Additionally, the Air Force continues to disregard utilizing turboprop aircraft.<sup>2</sup>

Since Air Superiority is an undisputed pre-requisite for operations and the Air Force prefers Interdiction to CAS, it follows that the number of available CAS sorties will decrease. Multi-role aircraft cannot focus on specific tasks, increasing fratricide risk to ground forces. Simply put, the Army requires an aircraft designed for CAS. As the 1950 X Corps report noted, "It is axiomatic that any weapon of war is best suited for the purpose for which it has been produced."<sup>3</sup> Nor does technology offer comprehensive solutions, as the basic problem of CAS remains developing a close relationship with ground forces and identifying targets.

Technology cannot solve these dilemmas; it can only provide enhancing tools. However, there is a point of diminishing returns: "Comparing fighter-bombers of both periods, it turns out that a Stuka was quite as capable of knocking out a WWII tank as an A-10 Warthog is of doing the same to present-day one. Similarly, P-47s in 1944-45 did not take many more sorties to bring down a bridge or hit a locomotive than an F-16 did six and a half decades later."<sup>4</sup> The cost of an F-16, however, is orders of magnitude higher than a P-47.<sup>5</sup>

Consequently, CAS is a need the Army must develop organically, as the services cannot overcome “the barriers that that prevent troops from receiving the realistic, standardized training” required.<sup>6</sup> Multi-role jets provide only some capabilities needed by ground forces. Jets are responsive, can carry significant ordnance, and are survivable against both high and low-order threats. Conversely, the displacement of air units from ground units and, the speed of jets necessitate relatively restrictive employment procedures, as opposed to the flexibility exhibited by Army attack helicopters.<sup>7</sup> Last, the ATO process makes USAF CAS reactive and only rarely closely coordinated with ground forces. Placing tactical air power in an autonomous service coordinated far above tactical units such as brigades and divisions was a mistake and distracted from both training and employing effective combined arms forces.

In the absence of significant USAF allocations, Army commanders will turn to the organic aviation assets at their disposal, primarily Army Aviation. However, Army commanders need the capability and flexibility that FW aircraft provide such as speed, loiter time, and altitude-based survivability, while the institutional Army will appreciate the low procurement and operational cost of such an aircraft. Combining the advantages of a FW turboprop with the proven capability of Army helicopters is the ideal solution.

The USAF’s global mission and broad responsibilities create a lack of focus on CAS. It is unrealistic to expect a service to operate globally at both the low and high end of the spectrum of conflict, fielding the same type of aircraft against sophisticated IADS and in permissive environments. Furthermore, given the complexity of ground operations, a one-size-fits-all solution is ideal to meet the Army’s CAS needs. Any future adversary will see these examples and adjust their tactics accordingly to nullify any

American or coalition asymmetrical advantage. An Army CAS platform that works in 80 percent of environments would be part of a broad range of solutions, creating flexibility for applying national power. This aircraft would augment, not replace, USAF CAS in permissive and semi-permissive environments, allowing the Air Force to focus on applying high-tech solutions to its broader, high-threat missions.

During WWII, AAF leaders like Arnold, Vandenberg, and Weyland realized that strategic and tactical air power required different aircraft, doctrine, and types of airmen. In FM 100-20, they wisely divided air power between the Strategic and Tactical Air Forces. The result was the impressive teamwork exhibited by 3rd Army and XIX TAC in Northern Europe. In the case of tactical air power, decentralizing control and pushing air assets forward to ground units enhanced both ground and air operations.

Army CABs reflect the heritage of the WWII TACs. CABs are aligned with Army ground units, forward located, and responsive to tactical developments. However, Army helicopters lack speed and endurance as well as firepower relative to jet aircraft. An Army turboprop aircraft would fill the capability gap between helicopters and USAF CAS. Such an aircraft would operate primarily at low-altitude in support of Army units but also have the capability to rapidly shift to JFACC requirements as well as operate at high altitude against a limited air defense threat. Turboprop aircraft possess the speed, endurance, and forward deployability required by ground forces at an affordable price. In a time of rising aircraft costs and declining defense budgets, Army FW CAS could provide the freedom the Air Force wants for aircraft designed for Air Superiority and Interdiction, by making reducing the Army's requirement for USAF CAS.

The joint air system reflects USAF preferences toward Interdiction by managing nearly all USAF capabilities well above Army tactical echelons (Appendix G). While this makes sense for strategic-operational-level missions such as aerial refueling, large-scale ISR, Interdiction, and Air Mobility, it is detrimental to CAS. During WWII and in every conflict since, the Army-Air Force CAS relationship began poorly before ultimately devolving control of assets and strikes to lower echelons. The exception is operations in Iraq and Afghanistan because current doctrine segregates Army and Air Force units.<sup>8</sup>

The result is a disjointed application of CAS, one that fails to develop close cooperation because air-ground teams never form because units rarely develop long-term working relationships. Mutual understanding is just as rare with vast distances and bureaucratic walls between ground and air. The Army should look to the Marine CAS model for the effective incorporation of FW assets into the air-ground team. If the Army procured its own CAS FW aircraft, it would reduce the Army's desire for an Air Force CAS-specific aircraft, freeing that service to pursue its institutionally preferred missions. The result would be better-integrated American military, with each service focused on particular institutional capabilities, rather than infighting.<sup>9</sup>

### Recommendations

The Army should fill the gap between its helicopters and USAF CAS with a FW attack aircraft. A turboprop aircraft within the CAB seems the best location for such an aircraft. Fielding this type of aircraft would augment USAF CAS, providing a responsive, capable attack platform to the Army for a relatively low cost. This transition could allow the Army CAB to support joint efforts, should the Army, pass excess sorties to the JFACC in the same way as Marine Aviation.<sup>10</sup>

### Topics for Future Study

1. What is the proper organization for an Army Fixed-Wing Attack Aircraft?
2. How can Army Aviation better integrate with the joint aviation community?
3. What future USAF technical developments warrant changes in Army doctrine?

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<sup>1</sup> Headquarters, Department of the Army, ADRP 3-0, 1-5, 1-6.

<sup>2</sup> Dahl, 4-13.

<sup>3</sup> X Corps, “Army Tactical Air Support Requirements,” 3.

<sup>4</sup> Van Creveld, 433.

<sup>5</sup> Hammond, 109.

<sup>6</sup> GAO, GAO-03-505, 2.

<sup>7</sup> FW aircraft utilized a 9-Line, target centric, CAS brief as opposed to the 5-Line, friendly-centric, brief used by RW aircraft. JP 3-09.3 *Close Air Support*, Ch. V.

<sup>8</sup> ALSA, ATP 3-52.2, Chapter II.

<sup>9</sup> Olive, 18.

<sup>10</sup> Joint Chiefs of Staff, JP 3-30 *Command and Control of Joint Air Operations* (Washington, DC: GPO, February 2014), II-16-II-17.



## GLOSSARY

**Air Interdiction (Joint):** Air operations conducted to divert, disrupt, delay, or destroy the enemy's military surface capabilities before it can be brought to bear effectively against friendly forces, or to otherwise achieve objectives that are conducted at such distances from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.<sup>1</sup>

**Air Power:** Airpower is the ability to project military power or influence through the control and exploitation of air, space, and cyberspace to achieve strategic, operational, or tactical objectives.<sup>2</sup>

**Close Combat Attack (CCA):** A hasty or deliberate attack by Army aircraft providing air-to-ground fires for friendly units engaged in close combat. Due to the close proximity of friendly forces, detailed integration is required.<sup>3</sup> See Appendix D.

**Counterland Operations (USAF):** "Airpower operations against enemy land force capabilities to create effects that achieve joint force commander objectives."<sup>4</sup>

**Flexibility:** Used throughout joint doctrine without being defined. For the purposes of this study, Flexibility is the ability to adapt to new and changing conditions as they occur.

**JFIRE.** Common name for a manual that outlines various multi-service techniques for CAS, artillery, mortar, and other joint fires. The JFIRE is a pocket-sized, quick-reference guide for requesting fire support in accordance with approved joint tactics, techniques, and procedures (TTP). Army nomenclature: FM 3-09.32.

**Joint Fires Observer (JFO):** A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations.<sup>5</sup> JFOs are primarily Army personnel trained to call for CAS/CCA.

**Permissive Environment:** Operational environment in which host country military and law enforcement agencies have control as well as the intent and capability to assist operations that a unit intends to conduct.<sup>6</sup>

**Tactical Air Power:** No longer found in doctrine. Historically Tactical Air Power referred to three tasks: (1) Gaining local air superiority; (2) Battlefield Interdiction; (3) Close Air Support to Ground Troops.<sup>7</sup> The 1949 JTASB defined definition was: "Tactical air power includes those elements of air power capable of applying fire power (bombers, fighters, fighter-bombers), those capable of securing intelligence (reconnaissance,) and those capable of providing logistic support (transport and troop carrier).<sup>8</sup> In short, tactical air power consists of the aspects of air power utilized in conjunction with or in support of the ground commander to further the ground campaign.

Time on Station (TOS): Time aircraft may remain at a specific location before departing for fuel or returning to base; expressed in terms of hours and minutes (H+MM).<sup>9</sup>

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<sup>1</sup> Joint Chiefs of Staff, Joint Publication (JP) 1-02 *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: GPO, 2015), 8.

<sup>2</sup> Department of the Air Force, Volume 1-*Basic Doctrine*, 24.

<sup>3</sup> Headquarters, Department of the Army, FM 3-04.126 *Attack Reconnaissance Helicopter Operations*, 1-4.

<sup>4</sup> Department of the Air Force, Annex 3-03 *Counterland Operations*, 3.

<sup>5</sup> Joint Chiefs of Staff, JP 1-02 (2015), 139.

<sup>6</sup> *Ibid.*, 189.

<sup>7</sup> Farmer and Strumwasser, 16.

<sup>8</sup> “Joint Tactical Air Support Board Charter,” October 24 1951, Joint Tactical Air Support Board, Decimal File 1949-1951, Army Field Forces HQs, General Staff, G-3 Section; 320.3 to 334, Box No. 478; Hq Army Ground Forces, Record Group 337; National Archives Building, College Park, MD.

<sup>9</sup> There is no specific reference how to report Time on Station. It is commonly used for CAS, CCA, and Air-Ground Operations (JP 3-09.3/FM 3-04.126) in terms hours and minutes in the HH+MM format.

## APPENDIX A

### KEY AGREEMENTS IN ARMY-AIR FORCE CAS

Year	Name	Issue	Effects	Remarks
1948	<b>Key West Agreement</b>	Roles of the Armed Services	All air power, except Naval Aviation, is a function of the USAF USAF provides CAS, Air Logistics, and Airborne support to the US Army Airborne Tactical Reconnaissance, Aerial Photography, and Aerial Cartography become USAF missions.	No mention of helicopters No weight-limits for Army Aircraft <b>Virtually all Army aircraft transferred to USAF by 1949</b>
1949	<b>Bradley-Vandenberg Agreement</b>	Weight Limits on Army Tactical Aircraft	Army allowed FW aircraft not exceeding 2,500 pounds in weight, and RW aircraft not exceeding 4,000 pounds. Army Aviation Tasks: fire adjustment, route reconnaissance, and courier duties	Army allowed aircraft "to expedite and improve ground combat procedures in forward battle areas"
1951	<b>Pace-Finletter Agreement #1</b>	Roles and Limits on Army Organic Aircraft	Army agreed to develop aircraft required for integral operation Weight Restrictions removed Army restricted from developing aircraft that duplicated Air Force capabilities CAS not an allowed mission	Army Combat Zone 50-70 miles deep Army Missions: ○ Command/Control ○ Liaison/Courier ○ Laying comm wire ○ Move Supplies and Troops
1952	<b>Pace-Finletter Agreement #2</b>	Roles and Limits on Army Organic Aircraft	Re-imposed weight restriction on Army Fixed-Wing Aircraft of 5,000lbs No Helicopter weight restriction CAS not an allowed mission	Army Combat Zone 50-100 miles deep Expands Army Aviation to include MEDEVAC, Fire Adjustment, and Topographic Survey
1956	<b>Wilson Memo (DoD Directive 5160.22)</b>	Roles and Limits on Army Organic Aircraft	Army Weight Limits: FW 5,000lbs, RW 20,000lbs Outlines 4 Army Aviation Missions: • Liaison and Communication • Observation, Adjust Fires, Survey • Airlift of Personnel and Materiel • MEDEVAC	Combat Zone expanded to ±100 miles of front Prohibits Army CAS, Tactical Recon, and Interdiction
1966	<b>Johnson-McConnell Agreement</b>	Tactical Airlift RW Proponency	Air Force relinquishes all claims for RW Aircraft designed for Intra-theater movement, supply, and fire support. Army permitted Armed Helicopters Army relinquishes FW airlift (CV-2)	Spurred by Army use of Armed Helicopters and tactical Fixed-Wing Aircraft in Vietnam
1975	<b>Army-Air Force MOU</b>	Relationship between Helicopters and FW CAS	Army Aviation acts as organic firepower Army acknowledges Air Force CAS is centrally controlled USAF develops the A-10 after Army cancels the Cheyenne Program	Congressional concern of duplicated effort between the services (A-10, AH-64, AV-8B)

1984	<b>31 Initiatives</b>	Agreement of Inter-Service Cooperation	Army-Air Force agree to develop Joint CAS & SEAD Doctrine Army affirms USAF lead on FW CAS Army/Air Force agree to enhance CAS training in maneuver units Air Force Agrees to provide more Air Liaison Officers (ALO) USAF begins enlisted JTAC program Joint Munitions Program	Development of Joint Firepower Doctrine  Beginning of modern JTAC programs
2011	<b>TACP/JFO Agreement</b>	Joint Fires Observers and Non-Certified CAS Controllers	JFOs allowed to control CAS under certain conditions Aligns Air Force TACPs into Army Maneuver Units at the Brigade Level. Aligns an USAF ASOS with Army Division HQ	Official assignment of USAF liaison officers to Army units and the alignment of each Army Division with an ASOS.

*Source:* Frederic Bergerson, *The Army Gets an Air Force: Tactics of Insurgent Bureaucratic Politics* (Baltimore: Johns Hopkins University Press, 1980); Robert Futrell, *Ideas, Concepts, and Doctrine: Basic Thinking in the United States Air Force 1907-1964* (Maxwell AFB, AL: Air University, 1974); Richard Irving Wolf, *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, 1987); Headquarters, US Army and Headquarters, USAF, “Memorandum of Agreement between the U.S. Air Force and the U.S. Army for Army/Air Force Liaison Support,” Washington, DC, March 2011.

### The 31 Initiatives, June 1984

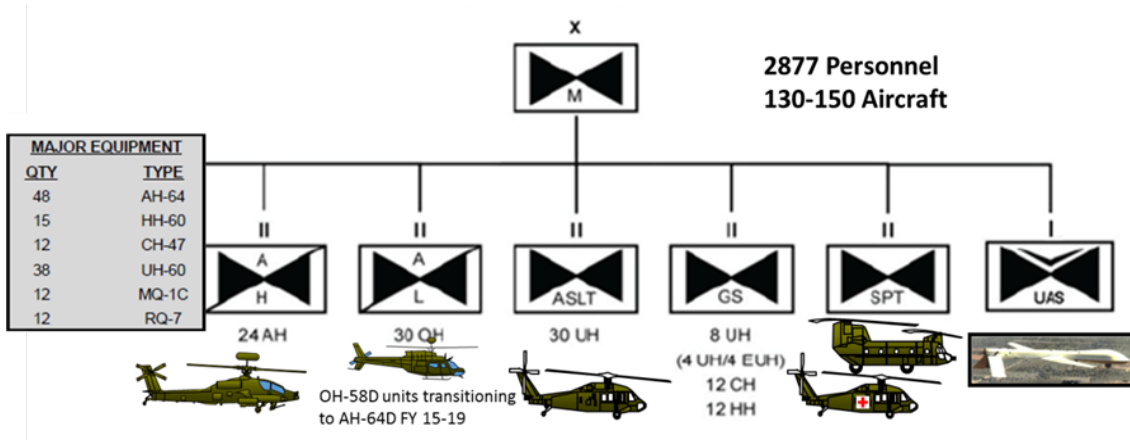
1. Area Air Defense
2. Point Air Defense
3. Counter Heliborne Assault
4. Tactical Missile Threat
5. (IFF) Systems
6. Rear Area Operations Centers
7. Host Nation Support Security
8. Air Base Ground Defense
9. Air Base Ground Defense Flight Training
10. Rear Area Close Air Support
11. Mobile Weapon System
12. Electronic Combat
13. Airborne Radar Jamming System
14. Precision Location Strike System
15. Joint Suppression of Enemy Air Defenses (J-SEAD)
16. Combat Search and Rescue
17. Rotary-wing lift support for Special Operations
18. Joint Tactical Missile System
19. Army and Air Force Munitions
20. Night Combat
21. Battlefield Air Interdiction (BAI)
22. Joint Target Set
23. Theater Interdiction Systems
24. Close Air Support
25. Air Liaison Officers and Forward Air Controllers
26. Manned Aircraft Systems
27. JSTARS
28. TR-1 (U-2 Upgrade)
29. Manned Tactical Reconnaissance
30. Intratheater Airlift
31. POM Priority List

*Source:* Richard Davis, *The 31 Initiatives: A Study in Air Force-Army Cooperation* (Washington, DC: Office of Air Force History, 1987), 48.

## APPENDIX B

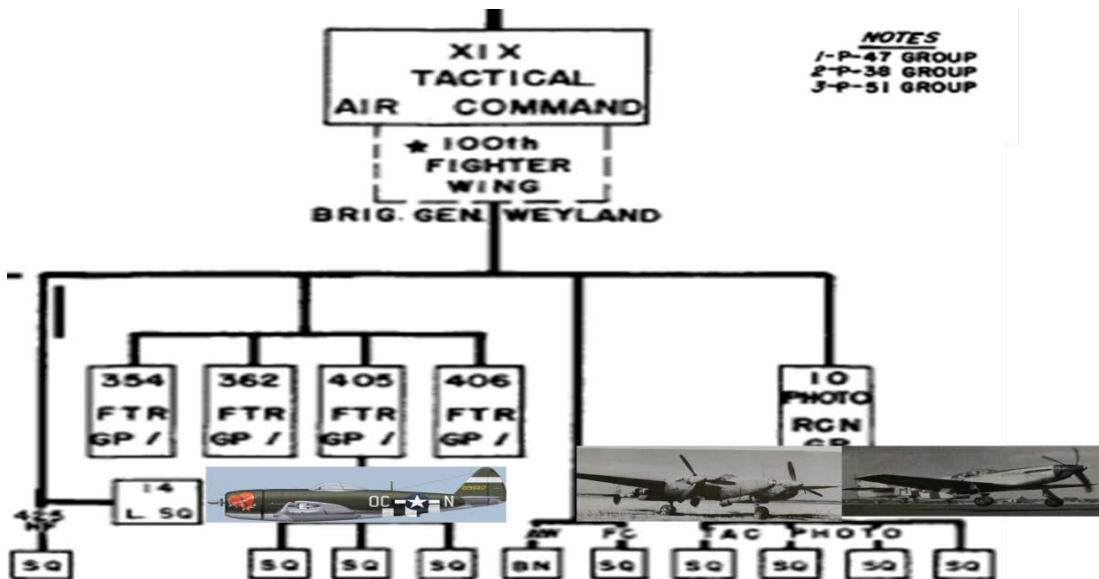
### CAB/TAC ORGANIZATIONAL CHART COMPARISON

Army CAB Organizational Chart (2014)



Source: HQ, Department of the Army, FM 3-04.111 *Aviation Brigades* (Washington, DC: GPO, 2003); Author's inclusion of aircraft graphics.

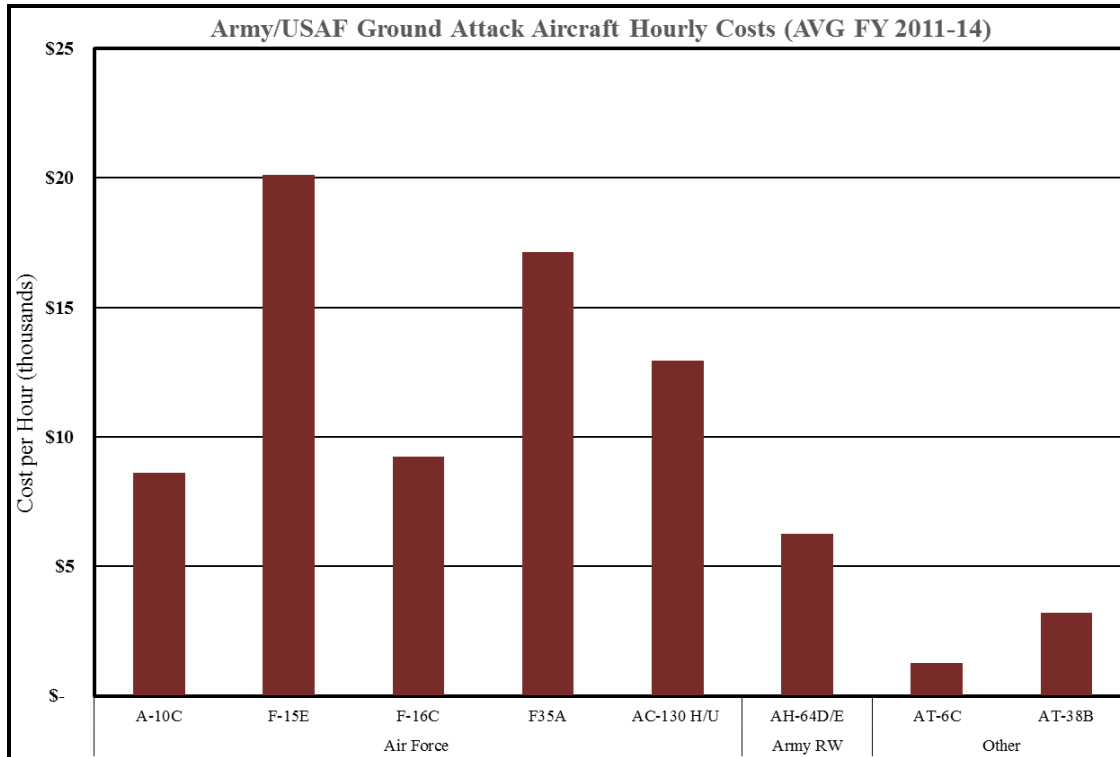
XIX TAC Organizational Chart (November 1944)



Source: Headquarters, Army Air Force, *Condensed Analysis of the Ninth Air Force in the European Theater of Operations* (1946; repr., Washington, DC: Office of Air Force History 1984); Author's inclusion of aircraft graphics.

## APPENDIX C

### GROUND ATTACK AIRCRAFT HOURLY COSTS



*Source:* Office of the Under Secretary of Defense (Comptroller), Chief Financial Officer, “Fixed Wing and Helicopter Reimbursement Rates,” Financial Management Reports, Fiscal Years 1996 through 2014, accessed April 28, 2015, <http://comptroller.defense.gov/>. AT-6C is increased by 25 percent.

## APPENDIX D

### CCA-CAS COMPARISON

<b>Term</b>	<b>Close Air Support (CAS)</b>	<b>Close Combat Attack (CCA)</b>
<b>Doctrinal Source</b>	JP 3-09.03 <i>Close Air Support</i>	FM 3-04.126 <i>Attack Reconnaissance Helicopter Operations</i>
<b>Procedures</b>	Joint Standardization	Unit Standardization
<b>Weapons Release Authority</b>	Terminal Controller	Pilot in Command
<b>Terminal Control Requirements</b>	Required	Not Required
<b>Coordination between Aircrew and Ground Force</b>	Minimal	Varied; Facilitated through Brigade Aviation Elements (BAE)
<b>Tasking Authority</b>	JFACC (Marines excepted)	Army Division or Combat Aviation Brigade (CAB)

*Source:* Michael Johnson, MAJ, USMC, “Cleared to Engage-Improving Joint Close Air Support Effectiveness” (Monograph, Air Command and Staff College, June 2008), 2-9; Joint Chiefs of Staff, Joint Publication (JP) 3-09.3 *Close Air Support* (Washington, DC: GPO, 2014); Patrick Wilde, “Close Air Support Versus Close Combat Attack.” (Master’s thesis, Army Command and General Staff College, 2012), 32-43.

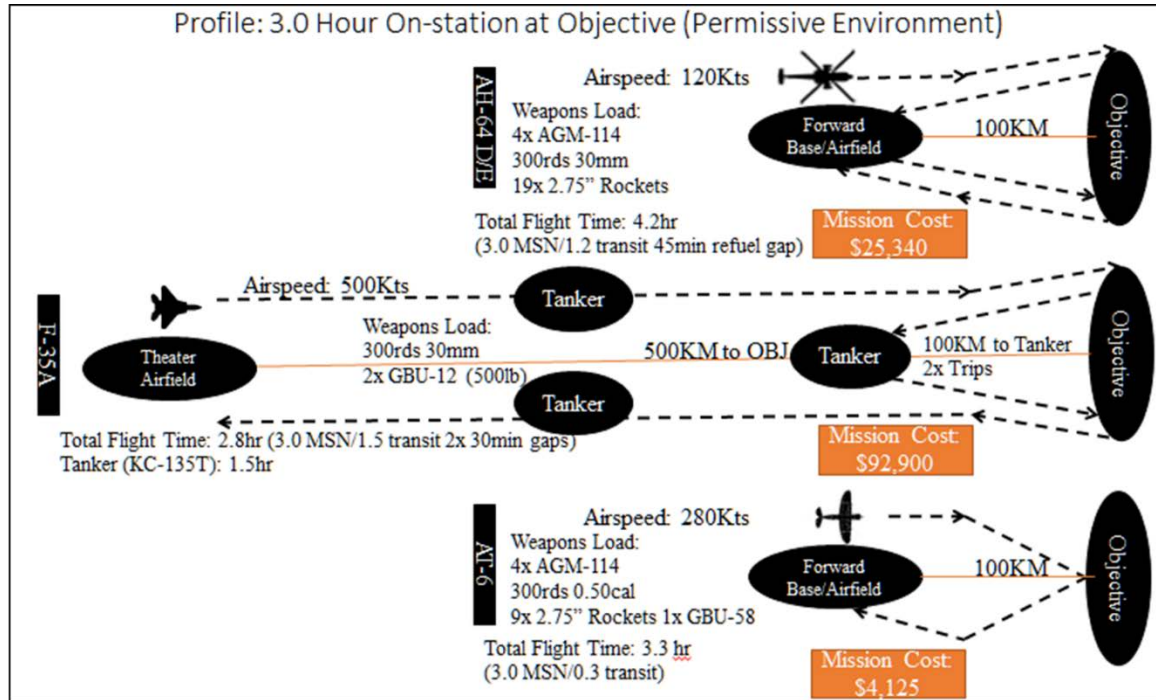
Air Force and Marine CAS commonly use target-centric procedures (9-Line), rather than friendly-centric procedures used by Army and Marine helicopters (5-Line).<sup>1</sup> The Marines still employ CAS procedures for their helicopters, but the format is identical to Army Aviation’s CCA.

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<sup>1</sup> Joint Chiefs of Staff, JP 3-09.3, Chapter III.

## APPENDIX E

### EXAMPLE MISSION COMPARISON

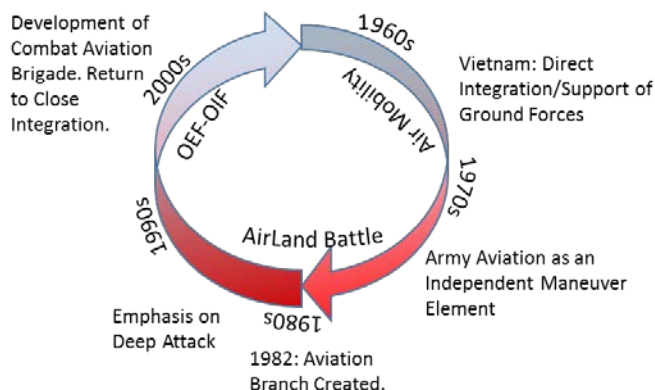


Source: Office of the Under Secretary of Defense (Comptroller), Chief Financial Officer, "Fixed Wing and Helicopter Reimbursement Rates," Financial Management Reports Fiscal Years 1996 through 2014, accessed April 28, 2015, <http://comptroller.defense.gov>. AT-6C is increased by 25 percent.



## APPENDIX F

### EVOLUTION OF ARMY AVIATION DOCTRINE



*Source:* Created by author.

Though it spent the period between Vietnam and 2001 focused on deep operations, Iraq and Afghanistan marked a turning point for Army Aviation. Beginning in 2003, Army Aviation reverted to “over the shoulder” support in Afghanistan and Iraq.<sup>2</sup> Rather than “fly away from the Army,” as the Air Corps had, by 2003 Army Aviation was firmly committed to supporting the Soldier in the ground fight.<sup>3</sup> Doctrine reflects the change; the 2007 attack-reconnaissance doctrine barely mentions deep operations.

Attack Helicopter Operations Field Manual Comparison		
	FM 1-112 (1997)	FM 3-04.126 (2007)
<b>Regulation Name</b>	Attack Helicopter Operations	Attack Reconnaissance Helicopter Operations
<b>Battalion Type</b>	Attack Helicopter Battalion	Attack Reconnaissance Battalion
<b>Mission Priority</b>	Attack, Recon, Security	Recon, Security, Movement to Contact, Attack
<b>Purpose</b>	Complement other maneuver forces	Facilitate ground movement
<b>Employment Level</b>	Battalion	Teams, prepared to fight at company/battalion
<b>Role</b>	Aerial maneuver units characterized as highly mobile and lethal; capable of destroying armor, personnel, and material	Shaping operations; maneuver units that dominate but do not occupy

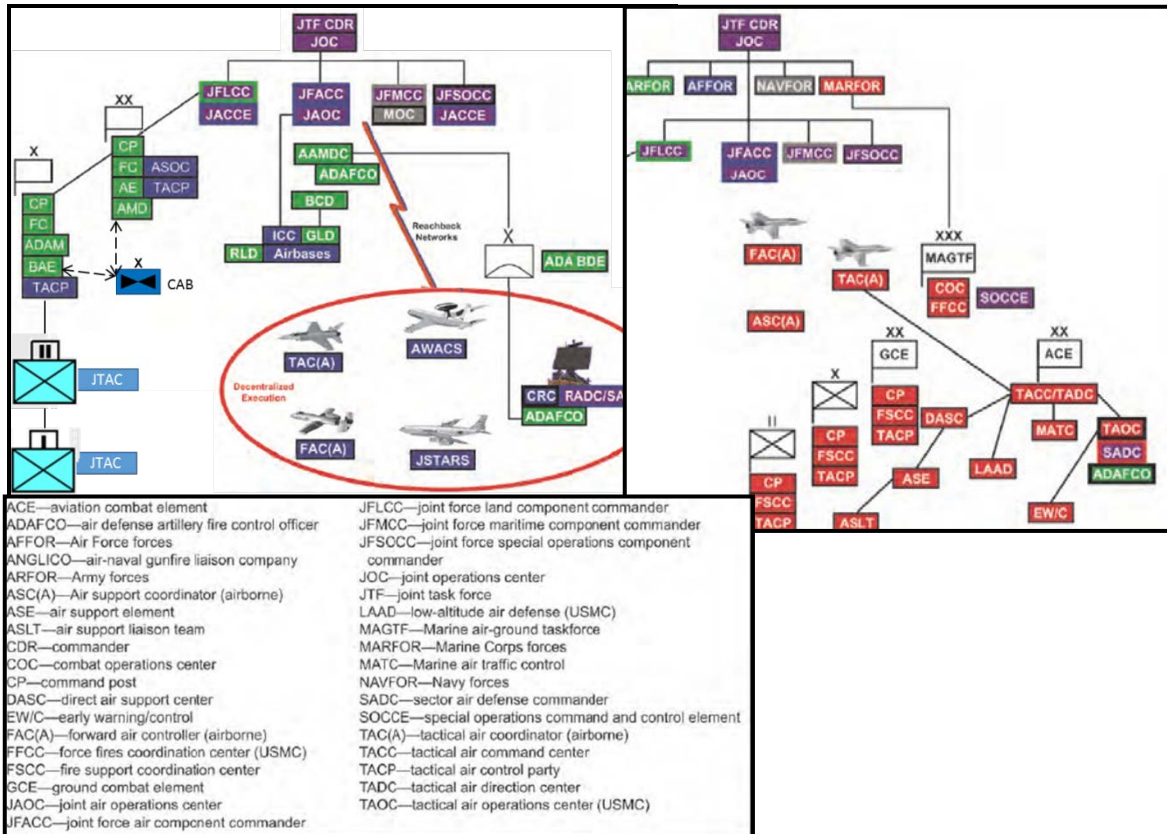
*Source:* Darren Buss, MAJ, USA, “Evolution of Army Attack Aviation: A Chaotic Coupled Pendulums Analogy” (Monograph, School of Advanced Military Studies, 2013).

<sup>2</sup> Demonstrated through major differences between FM 3-04.126 and FM 3-04.111 compared to their earlier versions.

<sup>3</sup> Williams, 380.

## APPENDIX G

### JOINT AIR-GROUND SYSTEM COMPARISON



Source: Joint Chiefs of Staff, Air Land Sea Application Center, *Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System* (Joint Base Langley-Eustis, VA: GPO, 2015). Author's compilation of graphics.

Army-Air Force coordination requires liaison through the JFACC. Though there are coordination elements, the Battlefield Coordination Detachment, located with Air Force squadrons, they are not part of Army units actually conducting missions. Explicit coordination between Army units and the pilots conducting CAS is unlikely given the echelons in between and the distance. Furthermore, the Air Force personnel conducting liaison and coordination for Army units, such as JTACs and Air Liaison Officers, are not organic to the Army. They remain part of the Air Force chain of command and move between Army units, inhibiting the development of lasting relationships. Conversely, Marine Aviation is an organic component of the Marine Air-Ground Task Force. Marine JTACs are organically to Marine maneuver units, enabling the development of teams and cooperation. Compared to both the USAF and Marine air-ground organizations, the Army CAB is more closely aligned with Army operations, both as a factor of proximity and integration.

## BIBLIOGRAPHY

### Government Documents

- Congressional Budget Office. National Security Division. *Alternatives for Modernizing U.S. Fighter Forces*, by David Athur and Kevin Eveker. Washington, DC: CBO, May 2009. Accessed March 15, 2015. <http://www.cbo.gov>.
- . *Modernizing the Army's Rotary-Wing Aviation Fleet*, by Kevin Eveker, David Newman, and David Arthur. Edited by Kate Kelly. Pub. No. 2898. Washington, DC: CBO, November 2007. Accessed March 15, 2015. <http://www.cbo.gov>.
- Department of Defense. DoD Directive 5100.01 *Functions of the Department of Defense and Its Major Components*. Washington, DC: GPO, 2010. Accessed March 1, 2015. <http://www.dtic.mil/whs/directives/corres/pdf/510001p.pdf>.
- . Office of the Under Secretary of Defense (Comptroller). Chief Financial Officer. *Fiscal Year 2016 Budget Request*. Washington, DC: GPO, February 2015. Accessed April 28, 2015. <http://comptroller.defense.gov>.
- . "Fixed Wing and Helicopter Reimbursement Rates." Financial Management Reports. Fiscal Years 1996 through 2014. Accessed April 28, 2015. <http://comptroller.defense.gov/>.
- . *Program Acquisition Cost by Weapons System* (FY 2014). Washington, DC: GPO, April 2013. Accessed April 28, 2015. <http://comptroller.defense.gov>.
- . *Program Acquisition Cost by Weapons System* (FY 2015). Washington, DC: GPO, March 2014. Accessed April 28, 2015. <http://comptroller.defense.gov>.
- . *Selected Acquisition Report* (AH-64E Remanufacture). Washington, DC, 2014. Accessed April 28, 2015. <http://www.dtic.mil: documentADA613931>.
- General Accounting Office (GAO). Military Readiness Division. GAO-03-505, *Lingering Training and Equipment Issues Hamper Air Support of Ground Forces*. Washington, DC: GAO, May 2003. Accessed May 1, 2015. <http://www.gao.gov>.
- . National Security and International Affairs Division. GAO/NSIAD-97-134, *Operation Desert Storm-Evaluation of the Air Campaign*. Washington, DC: GAO, June 1997.
- Harrigan, Jeffrey, MG, USAF. "Executive Summary of Coalition Airstrike in the Vicinity of Arghandab, Afghanistan on 9 June 2014." US Central Command, August 2014. Accessed May 8, 2005. <http://www.scribd.com/doc/238691680>.
- Headquarters, Pacific Air Forces, Tactical Evaluation Center. "The Fall of a Shau," by Kenneth Sams. Hickam AFB, HI, April 1966. Accessed May 5, 2015.

<http://www.nationalmuseum.af.mil/shared/media/document/AFD-060629-001.pdf>.

United States Marine Corps, "AV-8B Capabilities Brief." Marine Weapons and Tactics Squadron, March 2010. Accessed April 15, 2015. <https://vcepub.tecom.usmc.mil/sites/msc/magtftc/mawts1/default.aspx>.

#### Third Party Data

Beechcraft Defense. "AT-6 Light Attack." Accessed May 5, 2015. <http://www.beechcraft.com/defense/at-6>.

Embraer Defense. "Super Tucano." Accessed May 5, 2015. [http://www.embraerdefensesystems.com/english/content/combat/tucano\\_origin](http://www.embraerdefensesystems.com/english/content/combat/tucano_origin).

Lockheed Martin, "F-35 Fast Facts." Accessed May 5, 2015. <http://www.f35.com/about>.

Meggison Technologies. "OurAirports." Accessed April 2014. <http://www.ourairports.com/world.htm>.

#### Service Doctrine, Procedures, and Strategy

Department of the Air Force. *50 More Questions Every Airman Can Answer*, by MAJ Frederick L Baier, USAF. Washington, DC: GPO, April 2002. Accessed May 15, 2015. <http://www.au.af.mil/au/awc/awcgate/afdc/50morequestions.pdf>.

———. *Air Force Glossary*. Washington, DC: GPO, 2013. Accessed April 1, 2015. <https://doctrine.af.mil>.

———. Annex 3-03 *Counterland Operations*. Washington, DC: GPO, 2014. Accessed April 1, 2015. <https://doctrine.af.mil>.

———. Volume 1-*Basic Doctrine*. Washington, DC: GPO, 2011. Accessed April 1, 2015. <https://doctrine.af.mil>.

———. Volume 3-*Command*. Washington, DC: GPO, 2013. Accessed April 1, 2015. <https://doctrine.af.mil>.

———. Volume 4-*Operations*. Washington, DC: GPO, 2013. Accessed April 1, 2015. <https://doctrine.af.mil>.

———. Office of Air Force Lessons Learned. *Operation Anaconda-an Air Power Perspective*. Washington, DC: GPO, 2005. Accessed May 4, 2015. [http://www.au.af.mil/au/awc/awcgate/af/anaconda\\_unclassified.pdf](http://www.au.af.mil/au/awc/awcgate/af/anaconda_unclassified.pdf).

- Headquarters, Department of the Air Force. *America's Air Force: A Call to the Future*. Washington, DC, July 2014. Accessed May 7, 2014. [http://airman.dodlive.mil/files/2014/07/AF\\_30\\_Year\\_Strategy\\_2.pdf](http://airman.dodlive.mil/files/2014/07/AF_30_Year_Strategy_2.pdf).
- Headquarters, Department of the Army. Army Doctrine Reference Publication (ADRP) 1-02 *Terms and Military Symbols*. Washington, DC: GPO, February 2015.
- . Army Doctrine Reference Publication (ADRP) 3-0 *Unified Land Operations*. Washington, DC: GPO, May 2012.
- . Field Manual (FM) 100-5 *Operations*, Washington, DC: GPO, 1982.
- . Field Manual (FM) 3-04.1111 *Aviation Brigades*. Washington, DC: GPO, 2003.
- . Field Manual (FM) 3-04.126 *Attack Reconnaissance Helicopter Operations*. Washington, DC: GPO, 2007.
- . Field Manual (FM) 3-90.6 *Brigade Combat Team*. Washington, DC: GPO, 2010.
- . Field Manual (FM) 6-20-30 *Fire Support for Corps and Division Operations*. Washington, DC: GPO, 1989.
- . Training Circular (TC) 7-100 *Hybrid Threats*. Washington, DC: GPO, 2010.
- Headquarters, Department of the Army, and Headquarters, United States Air Force “Memorandum of Agreement Between the U.S. Air Force and the U.S. Army for Army/Air Force Liaison Support,” Washington, DC, March 2011.
- Headquarters, War Department. FM 100-20 *Command and Employment of Air Power*. Washington, DC: GPO, 1943.
- Joint Chiefs of Staff. Joint Publication (JP) 1-02 *Department of Defense Dictionary of Military and Associated Terms*. Washington, DC: GPO, 1989.
- . Joint Publication (JP) 1-02 *Department of Defense Dictionary of Military and Associated Terms*. Washington, DC: GPO, 2015.
- . Joint Publication (JP) 3-09.3 *Close Air Support*. Washington, DC: GPO, 2014.
- . Joint Publication (JP) 3-30 *Command and Control of Joint Air Operations*. Washington, DC: GPO, February 2014.
- . “The Use of Propeller and Jet Aircraft in Laos.” Washington, DC, 1968. Accessed April 20, 2015. [http://www.dod.mil/pubs/foi/International\\_security\\_affairs/vietnam\\_and\\_southeast\\_asiaDocuments/700.pdf](http://www.dod.mil/pubs/foi/International_security_affairs/vietnam_and_southeast_asiaDocuments/700.pdf).

———. Air Land Sea Application Center (ALSA). Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System. Joint Base Langley-Eustis, VA: GPO, 2015.

———. JFIRE: Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower. Joint Base Langley-Eustis, VA: GPO, 2012.

#### Historical Studies, Documents, and Summaries

Ambrose, Stephen E. *Eisenhower: Soldier and President* New York: Simon and Schuster, 1990.

Axelrod, Alan. *Patton: A Biography*. New York: Macmillan, 2006.

Bergerson, Frederic A. *The Army Gets an Air Force: Tactics of Insurgent Bureaucratic Politics*. Baltimore: Johns Hopkins University Press, 1980.

Cooling, Benjamin Franklin, ed. *Case Studies in the Development of Close Air Support*. Washington, DC: Office of Air Force History, 1990.

Davis, Richard G. *The 31 Initiatives: A Study in Air Force-Army Cooperation*. Washington, DC: Office of Air Force History, 1987.

———. *Decisive Force-Strategic Bombing in the Gulf War*. Washington, DC: Air Force History and Museums Program, 1996.

Department of the Air Force, Historical Division. "The Employment of Strategic Bombers in a Tactical Role 1941-1951." Air University, Maxwell AFB, AL, 1953. Accessed May 7, 2015. <http://www.afhra.af.mil/studies/numbered-usafhistoricalstudies51-100.asp>.

Douhet, Giulio. *The Command of the Air*. 1921. Translated by Dino Ferrari. Washington, DC: Office of Air Force History, 1998.

Fallows, James. *National Defense*. New York: Random House, 1981.

Farley, Robert M. *Grounded: The Case for Abolishing the United States Air Force*. Lexington, Kentucky: University Press of Kentucky, 2014.

Farmer, J., and M. J. Strumwasser. *The Evolution of the Airborne Forward Air Controller*. Santa Monica, CA: RAND, 1967.

Fontenot, Gregory, COL (ret.), USA, LTC E. J. Degen, USA and LTC David Tohn, USA. *On Point: The United States Army in Operation Iraqi Freedom*. Ft. Leavenworth, KS: Combat Studies Institute Press, 2005.

- Futrell, Robert Frank. *The United States Air Force in Korea, 1950-1953*. New York: Duell, 1961.
- . *Ideas, Concepts, Doctrine: Basic Thinking in the Us Air Force*. Maxwell AFB: Air University Press, 1989.
- Goldberg, Alfred, and LTC Donald Smith, USAF. *Army-Air Force Relations: The Close Air Support Issue*. Santa Monica, CA: RAND, 1971.
- Greenberg, Eugene M. "Signals, the Story of Communications in the XIX Tactical Air Command up to V-E Day." XIX TAC Headquarters, Germany, June 1945, Library of Congress, Washington, DC.
- Greenfield, Kent R., LTC, USA. "Army Ground Forces and the Air-Battle Team." Historical Section, Army Ground Forces, Study No. 35, Ft. Monroe, VA, May 1948. Accessed April 30, 2015. <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA954913>.
- Hammond, Grant Tedrick. *The Mind of War: John Boyd and American Security*. Washington, DC: Smithsonian Institution Press, 2001.
- Hastings, Max. *Overlord: D-Day and the Battle for Normandy*. New York: Simon and Schuster, 1984.
- Head, William P., and Earl H. Tilford. *The Eagle in the Desert: Looking Back on U.S. Involvement in the Persian Gulf War*. Westport, CT: Praeger, 1996.
- Headquarters, Department of the Army. Assistant Vice Chief of Staff of the Army. An Abridged History of the Army Attack Helicopter Program. Department of the Army, Washington, DC, May 19, 1975. Accessed April 25, 2015. [https://server16040.contentdm.oclc.org/cdm4/item\\_viewer.php?CISOROOT=/p4013coll11&CISOPTR=175&CISOBX=1&REC=8](https://server16040.contentdm.oclc.org/cdm4/item_viewer.php?CISOROOT=/p4013coll11&CISOPTR=175&CISOBX=1&REC=8).
- Holley, I. B. "A Retrospect on Close Air Support." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 535-555. Washington, DC: Office of Air Force History, 1990.
- Horwood, Ian. *Interservice Rivalry and Airpower in the Vietnam War*. Fort Leavenworth, KS: Combat Studies Institute Press, 2006.
- Hughes, Thomas Alexander. *Over Lord: General Pete Quesada and the Triumph of Tactical Air Power in World War II*. New York: Free Press, 1995.
- Jacobs, W. A. "The Battle for France, 1944." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 237-293. Washington, DC: Office of Air Force History, 1990.

- MacCuish, Donald A. "The Flight to Irrelevance?" In *Routledge Global Security Studies*, edited by Aaron Karp, Regina Cowen Karp, and Terry Terriff, 303-315. New York: Routledge, 2008.
- Mansoor, Peter R. *The GI Offensive in Europe: The Triumph of American Infantry Divisions*. Lawrence, KS: University of Kansas Press, 1999.
- McCaffrey, Terrance J., LTC, USAF. *What Happened to Battlefield Air Interdiction?* Maxwell AFB, AL: GPO, 2004.
- McGrath, John J. *Fire for Effect: Field Artillery and Close Air Support in the US Army*. Leavenworth, KS: Combat Studies Institute Press, 2010.
- Meilinger, Phillip S. *Hoyt S. Vandenberg, the Life of a General*. Bloomington, IN: University Press, 1989.
- Millet, Arthur. "Korea 1950-1953." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 345-410. Washington, DC: Office of Air Force History, 1990.
- Mitchell, William, BG, USA. "Winged Defense. 1925. In *Roots of Strategy-Book 4*, edited by David Jablonsky, 408-515. Mechanicsburg, PA: Stackpole Books, 1999.
- Momyer, William W. *Air Power in Three Wars, Flight, Its First Seventy-Five Years*. New York: Arno Press, 1980.
- Murray, Williamson, and Allan Millett. *A War to Be Won: Fighting the Second World War*. Cambridge, MA: Belknap Press of Harvard University Press, 2000.
- Murray, Williamson. *Air War in the Persian Gulf*. Baltimore: Nautical and Aviation, 1995.
- Naylor, Sean. *Not a Good Day to Die: The Untold Story of Operation Anaconda*. New York: Berkley Books, 2005.
- Rust, Kenn. *The 9th Air Force in World War II*. Fallbrook, CA: Aero Publishers, 1967.
- Sbrega, John. "Southeast Asia." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 411-490. Washington, DC: Office of Air Force History, 1990.
- Scales, Robert H. *Certain Victory: The U.S. Army in the Gulf War*. Fort Leavenworth, KS: Army Command and General Staff College Press, 1994.
- Showalter, Dennis E. *Patton and Rommel: Men of War in the Twentieth Century*. New York: Berkley Caliber, 2005.



- Shwedo, Bradford. *XIX Tactical Air Command and Ultra*. Maxwell AFB, AL: Air University Press, 2001.
- Spires, David. "Patton and Weyland: A Model for Air-Ground Cooperation." In *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940-43*, edited by Daniel R. Mortensen, 147-163. Maxwell AFB, AL: Air University Press, 1998.
- . *Air Power for Patton's Army: XIX Tactical Air Command in the Second World War*. Washington, DC: Air Force History and Museums, 2002.
- . *Patton's Air Force: Forging a Legendary Air-Ground Team*. Washington, DC: Smithsonian Institution Press, 2002.
- Sprey, Pierre. "The Case for Better and Cheaper Weapons." In *The Defense Reform Debate*, edited by Asa Clark, 193-208. Baltimore: Johns Hopkins Press, 1984.
- Syrett, David. "The Tunisian Campaign, 1942-43." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 153-192. Washington, DC: Office of Air Force History, 1990.
- Tolson, John J. *Airmobility in Vietnam*. New York: Arno Press, 1981.
- Van Creveld, Martin. *The Age of Airpower*. New York: Public Affairs, 1998.
- Warden, John A. *The Air Campaign*. San Jose, CA: toExcel, 1998.
- Williams, James W. *A History of Army Aviation: From Its Beginnings to the War on Terror*. Lincoln, NE: iUniverse, 2005.
- Winnefeld, James A., Preston Niblack, and Dana J. Johnson. *A League of Airmen: U.S. Air Power in the Gulf War*. Santa Monica, CA: RAND, 1994.
- Wolf, Richard Irving. *The United States Air Force: Basic Documents on Roles and Missions*. Washington, DC: Office of Air Force History, 1987.

#### Journal Articles

- Andres, Richard B., and Jeffrey B. Hukill. "Anaconda: A Flawed Joint Planning Process." *Joint Forces Quarterly*, no. 47 (4th Quarter 2007): 135-140.
- Fedorchak, Scott A., CAPT, USAF. "Close Air Support: Repeating the Past . . . Again?" *Airpower Journal* 8, no. 1 (Spring 1994). Accessed May 9, 2014. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj94/spr94/fedor2a.html>.

- Gavin, James M. "Cavalry and I Don't Mean Horses." *Harper's Magazine* (April 1954): 54-60. Accessed May 5, 2015. <http://harpers.org/archive/1954/04/cavalry-and-i-dont-mean-horses>.
- Hagenbeck, Franklin L, MG, USA. "Afghanistan: Fire Support for Operation Anaconda." *Field Artillery* (September-October 2002): 5-14.
- Hostage, Mike, LTG, USAF. "A Seat at the Table." *Air and Space Power Journal* 24, no. 4 (Winter 2010): 18-20.
- Huston, James A. "Tactical Use of Air Power in World War II: The Army Experience." *Military Affairs* 14, no. 4 (Winter 1950): 166-185.
- Kirkpatrick, Charles E. *Joint Fires as They Were Meant to Be: V Corps and The 4th Air Support Operations Group During Operation Iraqi Freedom*. Arlington, VA: Association of the United States Army, 2004.
- Mayock, Thomas J. "Notes on the Development of AAF Tactical Air Doctrine." *Military Affairs* 14, no. 4 (Winter 1950): 186-191.
- Pietrucha, Michael W., COL, USAF. "The Comanche and the Albatross." *Air and Space Power Journal* 28, no 3 (May-June 2014): 133-156.
- Press, Daryl G. "The Myth of Air Power in the Persian Gulf War and the Future of Warfare." *International Security* 26, no. 2 (Fall 2001): 5-44.
- Smith, Russell J., COL (Ret.), USAF. "Common Sense at the Crossroads for Our Air Force." *Air and Space Power Journal* 26, no. 2 (March-April 2012): 90-117.
- Warden, John A. III, COL, USAF. "The Enemy as a System." *Air and Space Power Journal* 14, no. 1 (Spring 1995): 1-14. Accessed May 5, 2015. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj95/spr95.htm>.
- Was de Czege, Huba BG (R), USA. "CAS: A Modified Paradigm." *Field Artillery* (March-April 2003): 2-3.

#### Primary Sources

- 3rd US Army. "After Action Report Third US Army 1 August 1944–9 May 1945." Library of Congress, Washington, DC.
- . "Third US Army Operations September-December 1944." 338.9.3, Box No. 484, Records of the Armies 1925-66, Record Group 338, National Archives, MD.
- Army Air Forces, Office of Statistical Control. *AAF Statistical Charts-1944*. Washington DC: GPO. Accessed May 5, 2015. <http://cgsc.cdmhost.com/cdm/ref/collection/p4013coll8/id/955>.

- . *Army Air Forces Statistical Digest*. Washington, DC: GPO, December 1945. Accessed May 5, 2015. <http://www.dtic.mil/dtic/tr/fulltext/u2/a542518.pdf>.
- Commander, US Naval Forces Vietnam. "Operation of Marine Forces, Vietnam-Monthly Historical Summary." March 1968. Accessed April 26, 2015. <http://www.dtic.mil/dtic/tr/fulltext/u2/a953615.pdf>.
- Department of the Army. Tactical Mobility Requirements (Howze) Board. "Final Report." Ft. Bragg, NC, August 1962. Accessed May 1, 2015. <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll11/id/1689>.
- Department of Defense. Records of the Joint Tactical Air Support Board, Decimal File 1949-1951, Army Field Forces HQS, General Staff, G-3 Section; 320.3 to 334, Box No. 478-490; HQ Army Ground Forces, Record Group 337; National Archives, College Park, MD.
- Guderian, Heinz Günther, and Fritz Kramer. *Fighting in Normandy: The German Army from D-Day to Villers-Bocage*. Edited by David C. Isby. Mechanicsburg, PA: Greenhill Books, 2001.
- . *Condensed Analysis of the Ninth Air Force in the European Theater of Operations*. 1946. Washington, DC: Office of Air Force History, 1984.
- Keaney, Thomas A., and Elliot A. Cohen. *Gulf War Air Power Survey Summary Report*. Washington, DC: GPO, 1993.
- Patton Papers, Box 49: 1944-1945, Manuscript Division, Library of Congress, Washington, DC.
- . Box 31: Correspondence, 1903-1945, Q-Z
- . Box 12: Diary 1943-1945.
- Quesada Papers, Box 7: United States Air Force Board of Review for Tactical Operations, 1949, Manuscript Division, Library of Congress, Washington, DC.
- Smith, Walter Beddell: Collection of World War II Documents, 1941-1945, Series VI: Air Force Operational Unit, Box 48, Dwight D. Eisenhower Presidential Library.
- Spaatz Papers; Box 134: Interrogations; Manuscript Division, Library of Congress, Washington, DC.
- United States Strategic Bombing Survey. *Summary Report (European War)*. Edited by Air University Press. Washington, DC: GPO, 1946. Accessed April 20, 2015. <http://aupress.au.af.mil/Books>.
- . *Air Force Rate of Operation-1945b*. Washington, DC: GPO, 1946.

———. *Statistical Appendix to Overall Report (European War)*. Washington, DC: GPO, 1947.

Vandenberg Papers; Box 53: Ninth Air Force; Manuscript Division, Library of Congress, Washington, DC.

X Corps. "Army Tactical Air Support Requirements and Trends in Air-Ground Methods." Korea, December 1950. Accessed April 28, 2015. <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll11/id/1571>.

XIX Tactical Air Command. "Twelve Thousand Fighter-Bomber Sorties: XIX Tactical Air Command's First Month Operations in Support of Third US Army in France." France, September 1944. Accessed March 1, 2015. <http://cgsc.contentdm.oclc.org/cdm/ref/collection/p4013coll8/id/356>.

———. *Statistical Summary of XIX Tactical Air Command*; Publications Files, compiled 1940 - 1945, NM8479, Record Group 165: Records of the War Department General and Special Staffs, 1860–1952; National Archives, College Park, MD.

#### Monographs, Research Papers, and Theses

Barks, Phillip B. "Anything But: Joint Air-Ground Training at the U.S. Army Ground Combat Training Centers." Master's Thesis, Joint Advanced Warfighting School, 2009.

Blake, Brett R., LTC, USAF. "AT-6: The Best USAF Investment for the Long War." Monograph, Air Command and Staff College, 2007.

Brengle, John, MAJ, USA. "Returning the Deep Attack as an Option for the Operational Commander." Master's Thesis, Army Command and General Staff College, 2013.

Buss, Darren MAJ, USA. "Evolution of Army Attack Aviation: A Chaotic Coupled Pendulums Analogy." Monograph, School of Advanced Military Studies, 2013.

Carr, Anthony B. "America's Conditional Advantage: Airpower, Counterinsurgency, and The Theory of John Warden." Research Paper, Air University, June 2009.

Chadsey, David S., MAJ, USAF. "Rebuilding the Joint Airborne Forward Air Controller: Analyzing Joint Air Tasking Doctrine's Ability to Facilitate Effective Air-Ground Integration." Master's Thesis, Army Command and General Staff College, 2013.

Chaffee, Neil, LTC, USA. "Expanding Fixed-Wing Aircraft Capability in Us Army Aviation Operations." Master's Thesis, Army Command and General Staff College, 2009.

Chandler, Michael J., LTC, USAF. "Gen Otto P. Weyland, CAS in the Korean War." Master's Thesis, School of Advanced Air and Space Studies, 2007.

- Dahl, Arden B. "The Warthog: The Best Deal the Air Force Never Wanted." Monograph, National Defense University, 2003.
- Gillet, Kristopher, MAJ, USA. "Air Mobility and the Development of Attack Aviation During the Vietnam War from 1965-1967." Master's Thesis, Army Command and General Staff College, 2014.
- Hasken, Scott A., MAJ, USA. "A Historical Look at Close Air Support." Master's Thesis, Army Command and General Staff College, 2003.
- Hinote, Clint, LTC, USAF. "Centralized Control and Decentralized Execution." Monograph, Air Force Research Institute, June 2008.
- Johnson, Michael H., MAJ, USMC. "Cleared to Engage-Improving Joint Close Air Support Effectiveness." Monograph, Air Command and Staff College, June 2008.
- Larsen, Todd M., MAJ, USAF. "John Boyd and the AirLand Battle Doctrine." Monograph, School of Advanced Military Studies, 2012.
- Laughbaum, Kent R., LTC, USAF. "Synchronizing Airpower and Firepower in the Deep Battle." Research Paper, Air University, 1999.
- Lewis, Michael, MAJ, USAF. "Lt Gen Ned Almond, USA: A Ground Commander's Conflicting View with Airmen over CAS Doctrine and Employment." Master's Thesis, School of Advanced Air and Space Studies, 1997.
- Lewis, Richard, LTC, USAF. "Desert Storm: JFACC Problems Associated with Battlefield Preparation." Monograph, Army War College, 1993.
- McNamara, Stephen J., MAJ, USAF. "Airpower's Gordian Knot: Centralized Vs. Organic Control." Monograph, Air University, 1994.
- Olive, Steven G., LTC, USAF. "Abdicating Close Air Support: How Interservice Rivalry Affects Roles and Missions." Research Paper, Army War College, 2007.
- Riley, Michael N., MAJ, USA. "The A-10 Thunderbolt as an Organic Army Asset." Master's Thesis, Army Command and General Staff College, 1991.
- Stinger, Russell, COL, USA. "Army Aviation - Backs to Its Roots." Research Project, Army War College, 2009.
- Tittel, Steven, MAJ, USAF. "Cost, Capability, and the Hunt for a Lightweight Ground Attack Aircraft." Master's Thesis, Army Command and General Staff College, 2009.
- Watts, Barry D., LTC, USAF. "The Foundations of US Air Doctrine-the Problem of Friction in War." Research Paper, Air University, 1984.

Weber, Edward V., MAJ, USAF. "The Future of Fixed-Wing Close Air Support: Does the Army Need It to Fight?" Master's Thesis, Army Command and General Staff College, 1998.

Wilde, Patrick Ryan, MAJ, USA. "Close Air Support versus Close Combat Attack." Master's Thesis, Army Command and General Staff College, 2012.